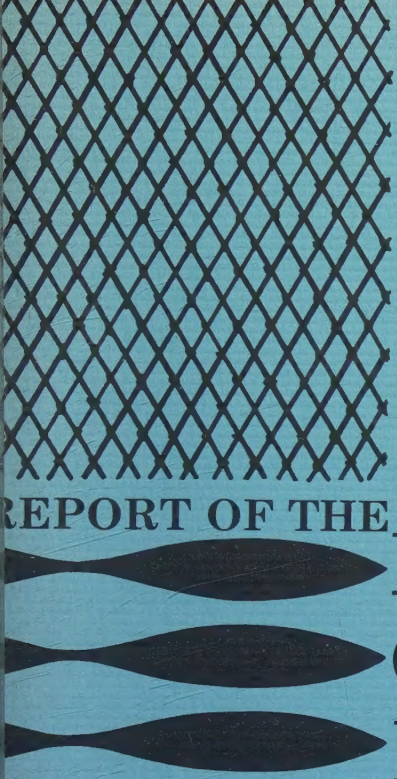

REPORT OF THE

BUREAU OF COMMERCIAL FISHERIES

FOR THE CALENDAR YEAR 1959

United States Department of the Interior
Fish and Wildlife Service
Bureau of Commercial Fisheries

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Report of the Bureau of Commercial Fisheries for the Calendar Year 1959

This is the third report of the Bureau of Commercial Fisheries, an agency of the Fish and Wildlife Service, U.S. Department of the Interior. This report is an account of the 1959 activities of the Bureau, together with a record of its administrative actions, as required by section 9(a) of the Fish and Wildlife Act of 1956.

The Bureau has the responsibility for carrying out the national fishery policy as outlined in the Fish and Wildlife Act of 1956. This policy is:

1. To increase and maintain forever, for the people of the United States, a fishery resource capable of yielding the maximum annual product.

2. To strengthen and maintain a vigorous fishery industry by assuring full and fair access to its raw materials and full and fair access to the American market.

3. To do these things in partnership with the States and in full accordance with our international obligations.

Programs have been developed to effect this policy. Most of them involve research, both fundamental and applied, that will result in new knowledge applicable to the solution of fishery problems. This research is biological, economic, and technological in nature. Other programs supply important services to the industry, such as promoting the consumption of fish, collection of fishery statistics and market news and publishing the reports, inspection of fishery products, vessel loans, vessel safety promotion, and many others.

The efforts of the Bureau are directed towards the objective of maintaining a strong, prosperous, and thriving fishing industry. It is obvious that this objective cannot be achieved quickly and readily because of the complexity of the many problems of the industry. This report for the year 1959 demonstrates that in many fields considerable progress has been made towards the objective of the Bureau.

Condition and Trends of the Fisheries

The commercial fisheries of the 50 United States in 1959 caught 5.1 billion pounds of fish valued at $346 million (Appendix A). The catch was the Nation's second largest on record, but the average price paid to the fishermen was only 6.8 cents per pound—the lowest in 14 years. The increase in volume of the catch was caused by record landings of menhaden. Other fisheries showing significant gains were the shrimp and Pacific sea herring. Large declines occurred in the production of Pacific sardines, salmon, Atlantic sea herring, tuna, and alewives. The drop in price was due mainly to sharp declines in landings of high-priced tuna and salmon, decreases in prices paid to fishermen for shrimp and Pacific halibut, and a substantial increase in the catch of low-priced menhaden—taken almost entirely for the manufacture of industrial products. Shrimp was again, however, the most valuable of all the fisheries, worth $58 million.

The Atlantic Coast States accounted for 54 percent of the catch, followed by the Gulf States with 22 percent; Pacific Coast States, 21 percent; and the Great Lakes and Mississippi River States, 3 percent. Landings in Hawaii accounted for less than one-half of 1 percent of the total.

In volume of landings, Reedville, Va., became the leading U.S. fishing port in 1959, receiving 324 million pounds—almost exclusively menhaden. San Pedro, Calif., which for many years had been the leading fishing port of the United States in both volume and value, was in second place with landings of 296 million pounds, and Lewes, Del., in third position with 283 million pounds. San Pedro, however, with landings valued at $26 million, again held first place with respect to the value of the catch. New Bedford, Mass., was in second place with $15.7 million; and Boston, Mass., third with $11.3 million.

Over 49 percent of the 1959 U.S. catch was used for the manufacture of industrial products—principally fish meal and oil. Nearly 30 percent was marketed fresh or frozen; 19 percent was canned; and approximately 2 percent was used in the manufacture of cured products.

The total U.S. supply of fishery products reached a record high of 8.4 billion pounds (round weight basis)—about 10 percent above the previous record established in 1952. Of this amount, 39 percent—both for human and industrial uses—was obtained from imports. Over 45 percent of the supply of fishery products for human food was imported. Exports of edible fishery products, principally canned sardines, and fish and marine animal oil increased 41 percent over those of 1958.

The 1959 U.S. per capita catch of fish and shellfish for human consumption was only 13.3 pounds. In 1950 it was 21.7 pounds; in 1940, 20.3 pounds; and in 1930, 20.1 pounds. (Edible weight=about one-half of these amounts.) The per capita consumption of fish and shellfish in the United States was 10.7 pounds—.3 pounds more than in 1958. This increase was in the consumption of fresh and frozen fish and shellfish. Consumption of canned and cured products remained the same. The actual total domestic pack of canned fishery products for human consumption was about 15 percent less than in 1958.

Highlights of the fisheries in 1959 were:

1. The record-breaking menhaden catch of 2.2 billion pounds (previous record, 1956—2.1 billion pounds) was the greatest annual catch of a single species ever taken by domestic fishermen.

2. The Alaska salmon catch was the smallest in nearly 60 years. The canned pack of salmon was the smallest since 1898.

3. For the first time, the catch of fish for industrial or other uses—2.8 billion pounds—exceeded the quantity taken for human consumption—2.4 billion pounds.

4. For the first time the value of imported fishery products—$366 million—exceeded the amount paid domestic fishermen for their catch—$346 million.

5. The domestic supply of fish meal and solubles of 536,622 tons was greater than in any other year. It was about 27 percent more than in 1958.

6. The U.S. production of fish portions increased 24 percent in volume over the previous year, thus setting a new record.

7. The pack of tuna canned in the United States, Puerto Rico, and American Samoa totaled a record 14.3 million cases, exceeding by 2 percent the previous record pack of 14.1 million cases in 1958.

Developments in the Fisheries

Domestic Fisheries

There are continual developments in the U.S. fishing industry, because the fisheries are always undergoing changes. These changes may be brought about in reaction to such factors as fluctuating fish abundance, the public's changing food preferences, foreign trade, and improvements in catching, handling, and processing. A review of 1959 indicates that the domestic fishing industry continues to be dynamic, with some rather outstanding events occurring in some of the fisheries.

Tuna

Extended tieups of the tuna clipper and purse seine fleets in disputes over prices paid to the fishermen for their catch of fish were the principal reason for a decrease in the 1959 tuna catch. Successful purse seine fishing early in the year kept the total catch from being even lower. Despite the decrease in the catch, the domestic canned pack of tuna established a new record. A sharp increase in tuna imports made this record possible.

Salmon

The decline in the 1959 U.S. salmon catch was particularly evident in Alaska except for red, or sockeye, salmon. Although 1959 was a pink salmon cycle year on Puget Sound, the catch of this species was low, and supplies of silver and chum salmon were down. An early season strike by Bristol Bay fishermen further added to the woe of the domestic salmon-canning industry.

Menhaden

The great menhaden production represented 43 percent of the total U.S. catch of all species in 1959. Menhaden were generally more abundant than formerly in all fishing areas and, according to Bureau biologists, will again be plentiful in 1960. The catch of menhaden consisted primarily of young fish with a low oil content; however, because of the volume of landings, the oil production showed an increase over the previous year. The record production of meal resulted in heavy supplies, and that together with increased imports caused meal prices to drop drastically late in the year.

Groundfish

The domestic production of groundfish was the lowest since 1943. At the same time, imports of groundfish established a new high record, accounting for 67 percent of the total supply available on the domestic market. Groundfish imports made up only 9 percent of the domestic supply in 1939, 25 percent in 1943, and now substantially exceed domestic production in their contribution to the national supply. The trend toward the use of convenience foods, such as fish portions, is at least proving a partial boost to the groundfish-processing industry.

Shrimp

The shrimp catch was up substantially in 1959 due primarily to the increased availability of the brown, grooved variety in the Gulf of

Mexico. Despite increased catches, the total value was down because of a serious supply-demand imbalance, which resulted in substantially lowered prices for shrimp. This oversupply situation was created by (1) heavy domestic productions; (2) large cold storage holdings, which remained at a high level throughout the year; and (3) increased imports from over 40 foreign countries. Exploitation of substantial populations of shrimp off British Guiana too was partially responsible for increased imports.

Herring

Maine production of herring was down about one-third because the fish were scarce in 1959. Use of the new air-bubble curtain gear by fishermen prevented an even further reduction in catch. Some of the deficit was made up by increased imports from Canada, but the canned pack was still down substantially from the previous year.

Pacific Sardine

The Pacific sardine industry was unsettled throughout the year. The catch was much less than that of the previous year. This was not due as much to lack of fish as it was to lack of markets. Because of heavy carryover supplies from the 1958 canned pack, the Pacific sardine market was in a depressed state at the outset of the 1959 fishing season and remained so throughout the year. Furthermore, fishing was delayed for about a month because of price disputes. When fishing resumed, canners limited the volume of fish they would accept.

Halibut

The total halibut catch for the United States and Canada set a new record in 1959 in spite of poor weather conditions during the fishing season. In Westward Area 3B which was opened for nonquota fishing before the start of the regular season, the vessels of the two countries recorded the highest catches ever made in that area.

Inland Fisheries

The 1959 U.S. catch in the Great Lakes and Mississippi River area approximated that of 1958. The landings of more desirable food fish, however, continued to decline, and the fishing industry of that area relied increasingly on rough fish for a livelihood. The trend toward the development of industrial fisheries to offset losses in food fisheries continued.

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Federal Legislation

Three bills pertaining to fishery matters were passed by Congress in 1959, and a memorandum of understanding was signed by the Departments of the Interior and State.

Acts

Two of the new acts are amendments to previous acts. One increases from $280,000 to $2,565,000 the annual appropriation for continuing studies of the effects of insecticides, herbicides, fungicides, and other pesticides upon fish and wildlife for the purpose of preventing losses of those invaluable natural resources. The other amends the Black Bass Act and insures the legality of shipment in interstate commerce of any fish or eggs for breeding or stocking purposes that were caught, taken, sold, purchased, possessed, or transported in accordance with the law of the State, the District of Columbia, or the Territory where such action took place.

The Act of September 22, 1959, provides for the comprehensive continuing study of migratory marine game fish for the purpose of developing wise conservation policies and constructive management activities. The study provides for research on migrations, identity of stocks, growth rates, mortality rates, variations in survival, environmental influences, and effects of fishing on the species.

To carry out the provisions of the act, the Secretary of the Interior is authorized to acquire land and equipment, construct laboratories and other buildings, purchase boats, employ personnel, and cooperate or contract with States or other agencies as he deems necessary. For these purposes, appropriations not to exceed $2,700,000 a fiscal year are authorized.

Memorandum of Understanding

The memorandum of understanding between the Departments of the Interior and State is an agreement to the need for the implementation by the Department of State and the Foreign Service of the United States of a mineral and fishery reporting program in foreign countries. This program will provide foreign economic and technological information to the Department of the Interior and other Federal agencies. The purpose of the agreement is to designate the responsibilities of each Department in the reporting program.

By Executive Order 10249, dated June 4, 1951, the State Department is responsible for servicing the foreign reporting needs of other Federal agencies. In the memorandum of understanding, dated May

5, 1959, the State Department recognizes the need for improving the reporting on minerals and fisheries and agrees to develop appropriate schedules and more comprehensive guidance materials for the reports. State personnel are to consult with officers of the Bureau of Mines and the Fish and Wildlife Service, appointed by the Department of the Interior for such consultation service.

The memorandum of understanding designates that in the improved reporting program it is the responsibility of the State Department to request funds for Minerals and Fisheries Officer positions at foreign posts where both Departments determine such positions are necessary. Appointments to these positions are to be from the staffs of the Bureau of Mines and the Fish and Wildlife Service if well-qualified officers are not available within the framework of the State Department Foreign Service. Recruitment of these officers from the Department of the Interior will come within the regular established procedures of the State Department Foreign Service, but upon completion of assignments, the officers will return to the Department of the Interior.

The Minerals or Fisheries Officers are responsible for the economic and technological reporting in their respective fields for the countries in which they are stationed. Usually they will be directed by the State Department Chief Economic Officer stationed there so that their work will fit into the overall reporting of the post.

Minerals and Fisheries Officers that have regional responsibilities will receive their instructions from the Department of State, after consultation with the Department of the Interior, through their post of residence and the posts of nonresidence that come within their region.

In connection with the improved reporting program, it is the responsibility of the Department of the Interior to provide briefing sessions for outgoing and incoming Minerals and Fisheries Officers and other officers reporting in these fields. It is the responsibility of the State Department to give these officers training through its various Bureaus and the Foreign Service Institute. Officers upon return from foreign duty are required to attend briefing sessions in Washington so that the staffs of the two Departments may benefit from their knowledge and experience.

A list of the legislation is given in Appendix B.

International Developments

Many problems affecting the fishing industry of this country have resulted from developments in foreign fishing industries. In the last

decade a number of countries have expanded their fisheries to provide increased catches not only for domestic use but also for export to the U.S. market. Since 1950 the U.S. catch of fish has increased only 1 percent. Canada and Central America have shown an increase of 9 percent. Europe (excluding the Union of Socialist Soviet Republics) increased 23 percent; the U.S.S.R., 61 percent; African nations, 82 percent; Asia (excluding the U.S.S.R.), 129 percent; and South America, 181 percent.[1] At the same time, export markets for U.S. fishery products have declined because of such factors as trade restrictions or increased competition from products of other countries. To assist the U.S. fishing industry in solving these problems, the Bureau participates with foreign countries in meetings concerned with such matters and in trade and tariff negotiations.

Because of increased imports in 1959, the domestic tuna industry, as well as the shrimp, fish meal, and groundfish industries, was confronted with a marketing problem. The Departments of the Interior and State, upon the request of the U.S. tuna producing and processing industry, arranged for a Government-to-Government meeting with Japan to consider topics of concern to the tuna industries of both countries. The Conference was held in Tokyo from September 30 to October 12, 1959. Seven U.S. Government and 15 U.S. tuna industry representatives participated; the Japanese delegation had equivalent representation. Among the mutual problems of the tuna industries considered were conservation, harvesting, processing, and past movements in the market. The two delegations found the meetings helpful in exploring tuna marketing problems and in obtaining an exchange of scientific and technical information. Periods of marketing distress were noted for the U.S. tuna fishing industry. With respect to conservation, information derived from extensive studies of Pacific Ocean circulation indicated no overfishing of any tuna stocks. The Japanese Government gave assurance that it would continue working with its industry to promote stable development of the U.S. tuna market to the mutual advantage of both countries.

Bureau representatives participated in two meetings held by the Organization for European Economic Cooperation (OEEC) to examine the fishery policies of the 17 member countries and of the United States and Canada. Both meetings were held in Paris, France: the first, March 12–24, 1959, and the second, June 20 to July 2, 1959. The objective of the meetings was to seek improved production and marketing policies.

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[1] Data released by the Food and Agriculture Organization of the United Nations.

A report was prepared covering conditions in the fisheries of each country—size of fleet and vessels, production, utilization, consumption, imports, exports, and the policies pursued with respect to duties, quotas, price stabilization programs, subsidies, low-interest loans, grants, landing bans, and other government programs. Measures ranging from general services to programs for direct financial support had encouraged an expansion of production and a high degree of self-sufficiency in fish supplies in most countries. Such measures, coupled with protection against imports in traditional importing countries, contributed to stagnation in intra-European trade in fish. Remedial actions were recommended.

Preparations were made for the Bureau's participation in the tariff negotiations under the General Agreement on Tariffs and Trade (GATT), scheduled to be held in Geneva in 1960. The United Kingdom lifted its restrictions on all canned fish and on fresh and frozen salmon from the North American dollar area. These actions had been sought through the procedures of GATT.

Also to assist the domestic fishing industry in its problems arising from foreign fishery developments, the Bureau provides information and advice to the industry on foreign trade problems and fishery developments through its foreign service program in connection with that of the State Department, its foreign market news reporting service, and its publications.

Fishery attachés stationed in Mexico City and Tokyo reported regularly on Latin American and Japanese fishery developments of significance to the U.S. fishing industry. As an aid in improving fishery reporting from other areas abroad, briefing classes were conducted periodically for new Foreign Service economic officers of the Department of State prior to their assignment to overseas posts. At these lectures, problems in U.S. fishery production and trade were outlined to indicate the types of reporting required on foreign fishing industries.

Several reports on foreign fishing and trade matters were published. One of these, "High-seas fisheries of the U.S.S.R.", brings together available information on the remarkable, recent expansion of the Soviet fisheries. Another report, "Japanese fisheries in overseas areas," describes the growth and magnitude of the overseas-based fishing operations of that country. This latter report plus two others "Marketing tuna in foreign countries" and "Trade agreements and how they are made" were prepared primarily for use at the Government-Industry Tuna Conference held in La Jolla, Calif., in May 1959. The Tokyo fishery attache was also brought to La Jolla to present the report "Some observations on present and future Japanese tuna fisheries."

The Bureau initiated a short market survey to determine the market prospects for canned California sardines in 15 foreign countries. American Embassies and Consulates obtained information on the market situation in these countries. A short market survey was also made to determine the market prospects for fish oils in the Netherlands, West Germany, and the United Kingdom, and a report was published on how the proposed European Common Market will affect the U.S. fisheries.

Large-scale trawl fishing was carried on by Soviet as well as Japanese fleets in the Bering Sea waters off Alaska during 1959. According to observations by Bureau and Coast Guard personnel, there was no evidence that either Soviet or Japanese vessels took salmon or significant numbers of halibut. Their catches were predominantly sole, flounder, and cod.

A delegation of Russian fisheries experts made a tour of the salmon fisheries in the Pacific Northwest and Alaska. Unfortunately, the trip was scheduled too late in the season for them to see much of the commercial salmon fisheries; however, the delegation did have an opportunity to observe many of the Bureau's activities and facilities.

Pursuant to a recommendation by the International Commission for the Northwest Atlantic Fisheries, regulations prescribing a minimum mesh size for trawl nets used in the capture of haddock and cod in Subarea 5 of the Northwest Atlantic Convention Area were amended, effective March 1, 1959, to include Subareas 3 and 4 as well. The mesh-size restriction, designed to prevent the loss of young fish, must now be observed by American fishermen in Canadian and Newfoundland waters in addition to the Georges Bank—Gulf of Maine area where it had previously been in effect.

Accomplishments and Operations

Principal Accomplishments

The accomplishments of the Bureau of Commercial Fisheries for the year 1959 were extensive, covering many fields of interest. The principal ones are listed here.

North Pacific

Fur seal management.—During 1959, in connection with the administration of the Pribilof Islands, Alaska, and the fur seal industry, construction of a new powerhouse on St. Paul Island was completed and enlargement of fuel storage facilities was begun.

The Interim Convention on Conservation of North Pacific Fur Seals passed through its second year in 1959; biological research by U.S. biologists was again adapted to the program and objectives of the convention. New sea areas were sampled off California from January through April by three vessels chartered by the United States for pelagic research. A collection of 1,548 seals was made. For the fifth consecutive year, 50,000 pups were tagged on the Pribilof Islands.

Counts of 12,530 harem and 14,184 idle bulls were completed, and pup mortality on the Pribilofs was calculated at 49,246 animals. Results of population, reproduction, and mortality studies were summarized and analyzed for presentation at the third annual meeting of the North Pacific Fur Seal Commission scheduled for January 1960.

Fur seal harvest.—Natural losses of young Pribilof fur seals resulted in less than the normal number of 4-year-old and only a negligible number of 3-year-old seals returning to the islands in 1959. The result was a take of only 30,191 male, the smallest regular male harvest since 1927, and 28,060 female seals.

At two auctions in the spring and autumn of 1959, the Fouke Fur Co. of St. Louis, Mo., fur seal processors, sold 48,596 sealskins for the account of the United States. Sales grossed $4,881,693 and netted $3,298,457 from the transactions after deduction of the company's charges for processing and sale. The company also disposed of 338 skins, including female skins used for experimental processing, for $4,455, of which the United States netted $2,387. In addition, the United States got a total of $34,821 for seal meal and oil produced on the Pribilof Islands in 1959 and sold at public sale by the Bureau.

Alaska fisheries.—In accordance with the provisions of the Alaska Statehood Act, the management of the commercial fisheries of Alaska by the Bureau of Commercial Fisheries came to an end on December 31, 1959, and this responsibility was assumed by the new State after that date. Thus for the Bureau, the year was a busy one. In addition to performing its management and regulatory responsibilities, the Bureau began the "phasing-out" of its management work in Alaska. It undertook the task of transferring property to the State authorities as provided by law and initiated coordinating programs with the new State government for transfer of the farflung management activities. A minimal staff was retained by the Bureau in Alaska for enforcing laws and regulations resulting from international treaty obligations of the U.S. Government. Most of the remaining management personnel were transferred to other programs of the Bureau throughout Alaska and the rest of the Nation.

Salmon studies.—Studies on the distribution of salmon in the North Pacific show some relationship between the abundance of mature red salmon in high-seas catches and the size of the subsequent red salmon run into Bristol Bay. Advance information on run size will be helpful to the industry in preparing for the fishing season.

Oceanographic studies in the North Pacific.—A large upwelling area south of the Aleutian Chain was revealed through oceanographic studies in the North Pacific. This upwelling, occurring in the spring, serves to replenish vital nutrients to the surface layer and thus permits considerable productivity. Preliminary results show some association between the hydrography of this area and salmon abundance and growth. Discoveries like this amplify the need for oceanographic research over broad oceanic areas. Only through such efforts can a better understanding of the relationship between the ocean environment and fish fauna be obtained.

Columbia River Fishery Program.—The Bureau's Columbia River Fishery Program Office in Portland, Oreg., administers the Columbia River Fishery Development Program, reviews proposed water-use development projects affecting commercial fisheries, and provides technical services to construction agencies concerned with the design of fishways and protective devices to ensure the safe passage of fish. The Columbia River Fishery Development Program is a cooperative program with the State fish and game agencies of Washington, Oregon, and Idaho, financed by the Federal Government. During 1959 the completion of 3 new stations increased to 20 the total number of salmon and steelhead hatcheries operating under the program. The egg take from returning adult fish climbed to nearly 180 million during fiscal year 1959, an increase of approximately 83 million over the preceding year's take. About 155 million young salmon and steelhead were released from program hatcheries.

Two new fishways on Columbia River tributaries were completed, making a total of 20 major fishways constructed since the inception of the program 11 years ago. Concurrently, stream-improvement activities—splash-dam removal, log-jam and debris clearance, and blasting of natural obstructions—now have made approximately 1,200 miles of stream area accessible for use of spawning salmon and steelhead. Idaho began screening water diversions by placing 10 screens in the Salmon River basin. An investigation of seminatural rearing of juvenile anadromous salmonids was started by first chemically treating and then stocking an artificial impoundment in Oregon.

A preliminary evaluation of the Columbia River Fishery Development Program was completed, and a report was prepared entitled "Review Report, Columbia River Fishery Development Program" (3 volumes).

California

Sardine studies.—Advances in the study of sardine subpopulations through the use of erythrocyte antigens as genetic indicators have been made by the Biological Laboratory at La Jolla. Three blood systems, designated A, B, and C, have been discovered in the sardine. Sardines tested from off central and northern California appear to belong to different genetic populations than those occurring off southern California and Baja California.

A high-speed plankton sampling device has been designed to study the continuous distribution of plankton in the environment of the sardine. The sampling of small zooplankton at close intervals in time and space is essential since these organisms are the outstanding constituents of the diet of both larval and adult sardines.

The Laboratory at La Jolla is studying and developing ways of improving field and laboratory methods in plankton collecting and processing. Experiments have shown the number of samples that must be collected per unit of time and space to give a certain desired accuracy in the results. A saving in ship and personnel time will be affected by application of this information.

Sea temperature studies.—The available sea surface temperature data are predominantly water injection temperature observations obtained from merchant and military ships. Practically no documentary evidence exists on the accuracy and scatter of these temperatures in comparison with more accurately measured temperatures of surface samples of sea water. In April 1959 a pilot study was initiated by the Bureau's Laboratory at Stanford, Calif., to obtain comparisons of injection and surface temperatures aboard Military Sea Transport Service ships in the Pacific. The data collected will be analyzed to determine what effects geographic location, season, and wind have on the temperature differences.

Hawaii

New method for prediction of skipjack catch.—One of the important projects being undertaken at the Biological Laboratory at Honolulu is a study of the ocean climate for the waters surrounding the Hawaiian Islands. An interesting and significant byproduct of the study has been the discovery of a relationship between the apparent local availability of skipjack during the summer fishing season and the time of "zero" rate of temperature change during the preceding winter. If the rate becomes zero during the last week of February, or before, a better than average season may be expected for the fol-

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lowing summer; however, should the rate become zero in March, a poor season's catch may be anticipated.

The predictive value of this relationship was tested for the 1959 season. In March the rate of temperature change index indicated that the forthcoming season would be similar to that of 1954, i.e., a very good year when about 14 million pounds of skipjack were landed by the local fleet. On this basis a good season was predicted. The catch was actually 13 million pounds. For an average year, it is about 10 million pounds.

North Pacific albacore studies.—In June 1959 the Laboratory at Honolulu terminated 5 years of field work in the North Pacific studying the distribution, abundance, and biology of the albacore and the associated oceanographic conditions. Recoveries of tagged fish suggest that there is a single population of albacore in the temperate North Pacific, fished by Americans off the West Coast during the summer and autumn, by the Japanese in midocean during the winter, and also by the Japanese in the western Pacific during the spring and summer. The best estimates of albacore growth are from tagged recoveries, which indicate that they are a relatively slow-growing species. Examination of albacore gonads from several areas shows that the fish do not spawn in temperate waters. Good evidence of spawning was found, however, in Hawaiian fish taken during June and July.

Underwater viewing chamber installed on Charles H. Gilbert.—To further the studies on the behavior of tunas, an underwater viewing chamber was installed within the stern portion of the hull of the *Charles H. Gilbert.* It is sufficiently spacious for observers to use various types of movie and still cameras for photographing the behavior of fish during normal fishing operations and under experimental conditions.

Tuna bait-fish program.—The tuna bait-fish program of the Biological Laboratory at Honolulu has followed two approaches: (1) to introduce potential bait fishes to Hawaiian waters and (2) to develop artificial culture methods. The excellent bait-fish qualities of the Marquesan sardine (*Harengula vittata*) were demonstrated from Bureau vessels fishing for skipjack in Marquesan waters. Hawaiian waters appeared to provide a suitable habitat for this species. Accordingly, in late 1955 the first of these fish were introduced, and additional plantings were made during 1956, 1957, and 1958. By 1959 the fish occurred around all the major islands, and there was good evidence that they had reproduced. They are now beginning to appear in some quantity in the bait catches of the tuna fishermen.

In August 1959 a shipment of threadfin shad (*Dorosoma petenense*)

was received from the U.S. mainland and stocked in a number of ponds and reservoirs on the Islands. This species also has the qualifications of an excellent bait fish and is expected to reproduce in island habitats.

In 1958 and again in 1959 the Bureau operated an experimental tilapia (*Tilapia mossambica*) hatchery on the island of Maui. Over a million bait-size fish were produced each year, and it was judged that the operation would be economically feasible if carried out on a larger scale.

Gulf of Mexico

Trawling for shrimp.—Experimental midwater trawling by the *Oregon* has indicated that such vessels hold promise for efficient harvesting of midwater-schooling fish in the Gulf of Mexico. Through the use of underwater motion-picture cameras, diving sleds, and diving equipment, gear specialists obtained information on the basic performance of shrimp trawls in action. From these observations, new and modified trawl designs and operational methods can be developed on a rational and scientific basis.

Juvenile shrimp studies.—The Biological Laboratory in Galveston, Tex., is conducting a 1-year investigation of juvenile shrimp to determine their movements and distribution. The study involves large-scale, systematic collecting of quantitative biological samples, utilizing high-speed collecting devices. The resulting data should provide indications of rate and direction of movement and bathymetric distribution of larval and postlarval shrimp and monitor their inshore and offshore movements through the passes.

Early in 1959 a study of penaeid shrimp life histories began at the Laboratory in Galveston. Its objectives were to describe and compare juvenile stages of local commercial species. Facilities and equipment for rearing juvenile shrimp from eggs to identifiable subadults were assembled and tested, and small batches of young penaeids were reared successfully. Developmental series of juvenile shrimp were also assembled from plankton and trawl net collections.

Tortugas pink shrimp study completed.—A study was completed under the auspices of the Bureau on the distribution of pink shrimp (*Penaeus duorarum*) on the Tortugas fishing grounds, particularly with respect to shrimp size in relation to depth of water. During the field work, extending over 1 year, 23 cruises were made and a total of 257 stations were occupied. The results indicate a general increase in the average size of shrimp with increased water depth. Further, shrimp appear to move away from land and from very shoal

areas as they grow and occur some distance from these regardless of depth. Finally, there is variation in the size-depth relationship. Smaller shrimp occur in the spring and again in the autumn regardless of the water depth. The current system in Florida Bay and on the fishing grounds is being studied to determine how the larvae, spawned offshore, reach the inshore nursery grounds. This is being accomplished by the use of drifting buoys tracked by radar and by analysis of temperature and salinity data.

Changes in abundance of shrimp species.—An apparent decline in the numbers of white shrimp (*Penaeus setiferus*) over the past 20 years has been accompanied by an apparent increase in the numbers of brown (*P. aztecus*) and pink (*P. duorarum*) shrimp. Until recently, however, statistics on the commercial shrimp catch were not collected with sufficient detail to permit analysis by species. Thus it is exceedingly difficult to evaluate the magnitude of the decline in the white shrimp population. Nevertheless it is known that 95 percent of the catch in the 1930's was composed of white shrimp and over one-third of the catch in 1949 was composed of brown and pink shrimp. Since 1949 this proportion has shifted further in favor of brown and pink shrimp. Laboratory studies were started during the year to determine physiological differences between these species and the possible causes for these changes in abundance.

Insecticide tests.—Some of the more commonly used insecticides were tested to determine their effects on shrimp and fish. The results show a wide range in the relative toxicity of the chemicals to the various species tested. DDT is toxic to adult white shrimp at concentrations of 15 parts per billion. Endrin and lindane, at concentrations of 0.5 and 2 parts per billion, were toxic to postlarval shrimp. Endrin was also highly toxic to fish, killing the sailfin molly at 2.5 parts per billion.

Red-tide toxicant studies.—The systematic screening of organic compounds to determine their relative effectiveness as red-tide (*Gymnodinium breve*) toxicants was started in March 1959 at the Laboratory in Galveston. This action constituted the first phase of a program to find an effective chemical means of controlling the extensive blooming and thus preventing widespread damage by the red-tide organism. The problem will be to find a substance extremely toxic to *G. breve* but not harmful to other forms of marine life.

Spanish-mackerel sales boost.—The Gulf Spanish-mackerel fishery had excess supplies in 1959 and called for assistance in selling the fish. The Bureau cooperated in a concerted national industry-Government sales push, and there was a "sellout" of Spanish mackerel.

Atlantic Coast

Analyses completed of Atlantic Ocean bottom-sediment samples.—The chemical analyses were completed on bottom-sediment samples taken on nine cruises of the Bureau's vessel *Theodore N. Gill* in 1953–54 in the Atlantic off the U.S. East Coast. Determinations were made of insoluble residue, loss of ignition, chlorinity, ferric oxide, calcium oxide, phosphorus pentoxide, manganese dioxide, strontium, aluminum oxide, magnesium, and potassium. The physical characteristics of the sediments were determined by a marine geologist. These chemical and physical data are being prepared for publication as a joint undertaking of the Laboratory at Brunswick, Ga., and the Oceanographic Institute of Florida State University.

Menhaden catch sampling program.—The results of the Bureau's annual menhaden-catch sampling program show that the menhaden purse seine fishery in each area along the Atlantic Coast is supported principally by a single, but different, year class. In southern waters (including Chesapeake Bay), the catches are dominated by Age-1 fish, in the Middle Atlantic by Age-2, and in northern waters by Age-3. Thus variations in year-class abundance, in part, account for catch fluctuations in different areas.

Preliminary studies on menhaden from southern Atlantic coastal waters indicate a continuous distribution of two or more species around the peninsula of Florida. Yellowfin menhaden (Brevoortia smithi) appears to be the principal species in waters south of Cape Canaveral. A second species, similar or identical to the Gulf menhaden (*B. patronus*), occurs in lesser abundance. Present information suggests that both species occur in southern Florida waters in commercial quantities at certain seasons.

Striped bass migrations studies.—Studies were completed by the Biological Laboratory, Beaufort, N.C., on the movement of large striped bass along the Atlantic Coast. Striped bass weighing from 6 to 52 pounds were tagged and released from 1955 to 1959. Striped bass tagged off North Carolina were recovered in North Carolina, Chesapeake Bay (prior to or during the spawning period), and along the coast north of Chesapeake Bay after the spawning season. Fish tagged in Chesapeake Bay were recovered in the Bay or along the Middle Atlantic and New England coasts in the summer and autumn and on the coast of North Carolina in late autumn and winter.

Exploratory fishing off North Carolina.—Exploratory fishing operations by the 96-foot charter vessel *Silver Bay* off the North Carolina coast revealed an extensive commercial hard-clam bed. The industry was advised. In addition, a sizable concentration of calico scallops was found, and a small commercial fishery began.

Biological Laboratory, Washington, D.C.—The program of this recently established Laboratory is directed towards assembling and integrating past records that bear on oceanography, geology, and the biological aspects of the environment of commercial fish species. Initially, temperature records for 1957 and 1959 are being assembled and analyzed. Altogether over 320,000 sea surface temperature records, 25,000 bathythermograms, and extensive series of other oceanographic observations will be examined and interrelations plotted.

Ichthyological Laboratory.—This Laboratory at Washington, D.C., conducts basic studies in fish taxonomy. In 1959 it contributed about 400 manuscript pages and 25 figures to a new volume in the series "Fishes of the Western North Atlantic." It is also conducting research directed toward a better understanding of the taxonomy of redfish and the cod fishes of the western North Atlantic.

Shellfish predator control.—One of the major problems in successful shellfish culture is the control of predators. In past years several methods have been proposed for controlling oyster drills and starfish, but they have not succeeded in solving the predator problem. Two promising approaches to the solution of this problem have been made by Bureau scientists at two of the laboratories.

Experiments using a combination of chemical and mechanical methods for controlling oyster drills were carried on for several years at the Bureau's Laboratory at Annapolis. These experiments led to the development of a low fence, consisting in part of copper wire. Oyster drills will not cross the copper. Thus, surrounding an oyster bed with such a fence would keep these predators from the oysters. This method was recommended to the industry after field tests on a commercial scale were successful.

For many years the Laboratory at Milford, Conn., has been screening chemicals to find specific compounds which would kill or repel shellfish predators. Although many effective chemicals were found, good methods for applying them were lacking. In 1959, however, chemicals were successfully bound to sand or gravel with heavy oils. Laboratory and small field experiments showed that the sand, so treated, could be spread on the bottom in a band around shellfish beds. Oyster drills or starfish attempting to cross this barrier were killed or repelled by the chemicals. Because of the slow rate that the chemicals dissolve in the water, the barrier remains effective for a considerable time and the danger of contamination of the water is minimized.

Fish behavior.—TV cameras made it possible to obtain some interesting observations on the behavior of fishes when captured in an otter trawl. Scientists at the Bureau's Biological Laboratory at Woods Hole, Mass., positioned the camera on the trawl so that the

actions of the fish could be observed as they entered the throat of the net. Most fish came into view heading upstream. Haddock, in particular, explored around for a short time and then entered the throat heading downstream. Those fish that came into view heading downstream usually swam directly through the throat without hesitation. It appeared that once fish pass into the net, they remain in the afterportion unless they escape through the meshes.

Study of Georges Bank.—A study of the interrelationship involved between bottom sediments and bottom-dwelling organisms was completed on Georges Bank. Bottom sediments are one of the major environmental factors that influence the occurrence of bottom-dwelling organisms, including some commercially important species of fish. The principal foods of groundfish are small- and medium-sized bottom organisms which usually are not evenly distributed over the fishing grounds but are concentrated in specific areas characterized by particular types of sediment. In the study of Georges Bank, sediment samples were collected at more than 200 locations and were analyzed for particle-size composition and amount of organic matter. The results showed that the central area of the Bank is covered by medium sand and that fine sand and very fine sand are found around most of the perimeter except along the northeastern edge where there is gravel. Silt and clay are found only in the deepwater basin to the northwest. All the sediments on the Bank contained only low quantities (mostly less than 0.5 percent) of organic matter. High values were recorded for the deepwater sediments northwest of Georges Bank.

Albatross III deactivated.—The Bureau's research vessel *Albatross III*, which the Biological Laboratory at Woods Hole has operated only sporadically since 1948, was deactivated on March 9, 1959. The advanced age of the vessel and resulting high maintenance costs made it uneconomical to operate further. Until a new vessel can be constructed, the Laboratory's sea program is being conducted on the Bureau's trawler *Delaware* based in Gloucester, Mass., and on chartered commercial vessels.

Construction at Woods Hole.—Progress has been made on the construction of the new laboratory at Woods Hole. On the site where the old wooden buildings had been since 1883, there is now a three-story masonry structure, which should be ready for occupancy early in 1960. The new laboratory, in addition to providing much more comfortable working space, will expand the opportunities for research. For the first time in many years, it will be possible to keep live fish in tanks supplied with running sea water. Temperature-controlled recirculated water will also be available.

The Bureau's aquarium at Woods Hole was for many years one of the chief attractions of that area. It was closed following damage caused by the hurricane of 1954. Construction has started on a replacement.

Air-bubble curtain gear for herring fishing.—Air-bubble curtain gear, pioneered by the Bureau, has been used during the past season by at least six companies engaged in fishing operations for sardine-size herring along the Maine coast. To demonstrate the value of this new gear, one company in Portland, Maine, was able to continue operations during the late summer when other canneries, not equipped with air-curtain gear, were forced to cease operations because the fish were beyond reach of conventional gear.

Report on Passamaquoddy studies.—The final report on the participation of the Biological Laboratory at Boothbay Harbor, Maine, in the Passamaquoddy studies was completed and submitted to the International Joint Commission in October.

Herring disease research.—Through experimental and field studies of several diseases, understanding of the role of disease among sea herring was advanced during the year at the Bureau's Biological Laboratory at Boothbay Harbor, Maine. Research has concentrated on two serious parasites: fungus disease caused by *Ichthyosporidium hoferi*, and "pigment spot" disease caused by larvae of the trematode, *Cryptocotyle lingua.*

Fish population studies.—To form a basis for population studies, comparisons were made of serological similarities and dissimilarities among five species of clupeoid fishes: herring, alewife, blueback, shad, and menhaden. Results so far show virtual serological identity of alewife and blueblack, some identity of antigens of menhaden and shad, and closer relationship of herring to shad than to the other species tested.

Great Lakes

Trawling for smelts.—Experimental fishing with Gulf of Mexico-type fish trawls in Lake Erie revealed that commercial quantities of smelt can be taken with this gear during the summer and early autumn months. The extremely abundant smelt is underutilized in the Great Lakes.

Changing conditions in Lake Erie.—A study of the data on conditions in Lake Erie over the last 60 years showed that certain changes have occurred. In earlier years mayfly nymphs were dominant in the bottom fauna of the lake. Currently two different forms—midge larvae and aquatic worms—predominate. Other significant changes

have occurred in fish populations. The commercial catch used to be principally blue pike and cisco, but now these two species have almost disappeared. Now smelt, yellow perch, alewife, and gizzard shad are more plentiful.

Studies to determine the reasons for the major changes in Lake Erie are continuing. To date it has been found that mean water temperatures have been approximately 2° F. warmer in recent years than in the period 1918–28. In addition, the concentrations of chlorides and nitrogen and phosphorous compounds have increased as much as 10 parts per million over earlier years, and there have been greater areas of low dissolved oxygen in bottom waters in later years.

Lamprey control.—Success in developing and testing selective toxicants that destroy sea lamprey larvae without significantly harming fish and other aquatic organisms made possible full-scale chemical control operations in streams tributary to the south shore of Lake Superior throughout the year. By the end of 1959 the toxicant had been successfully applied to more than half of the tributaries of the United States that require treatment.

General

Foreign shrimp harvests.—About 20 U.S. shrimp vessels are now operating out of British Guiana. They are exploiting the substantial shrimp populations discovered by the Bureau's exploratory fishing vessel *Oregon* during the past 2 years.

Quality test for shrimp.—A new test method to determine the quality of shrimp has been developed at the Bureau's Technological Laboratory in College Park, Md. The method will serve to verify and supplement organoleptic test procedures. This quality test is now being used by the Bureau in its inspection and certification service.

Developments in technological research.—A study of the formation of volatile organic acids during the deterioration of fish flesh marked the first extensive use of a gas chromatograph to determine the volatile acids in fish extracts. The only acids found while the fish were organically acceptable were acetic and formic acids. One major exception was found—the formation of individual acids in fish incubated at various temperatures. Propionic acid increased at a greater rate than other acids at higher incubation temperatures. The goal of this research program at the Technological Laboratory, Gloucester, Mass., is to develop means of retarding spoilage.

A technique for separating, characterizing, and determining the quantity of each of the fatty acids in a fish oil sample has been developed in collaboration with the Hormel Institute. The complete

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process of separating microgram quantities, which are then measured in a gas-phase chromatographic apparatus, now takes only 45 minutes.

Refrigerated sea water for storing whiting on vessels.—Bureau technologists at Gloucester, Mass., have demonstrated that it is practical to use refrigerated sea water for storing whiting prior to processing. This new medium will maintain fish in a much fresher condition than the old method of storing fish in ice. Whiting stored in this manner was judged to be of good quality after 14 days, whereas ice-stored fish were of poor quality after only 9 days.

Exempt-trucking study completed.—A study of exempt-truck operations in the fishing industry was completed for the Bureau by a private research firm. In making the study, the usual routes of haulage, destination and quantity of shipments, type of equipment used, and type of service rendered by trucking firms were investigated. Average rates charged during specific periods and for particular products were examined for comparison with competitive transportation services. With such factual data available, the fishing industry now is in a better position to present the merits of its case for the maintenance of the exemption of trucks carrying fresh and frozen fishery products from the rate filing and certification requirements of the Interstate Commerce Commission. This exemption, which is authorized in the Interstate Commerce Act, is being continuously assailed by various special-interest groups.

Fishing vessel safety program.—Through the efforts of the Bureau's fishing vessel safety program in New England, a Port Safety Committee for Fisheries—the first of its kind in the United States—has been established in Portland, Maine. The purpose of this committee is to promote increased safety at sea aboard fishing vessels. Causes of accidents will be investigated, and preventive measures will be suggested.

Inspection and certification service expanded.—In 1959 the Bureau's inspection and certification service expanded in several directions. Nine fish processors were added to the ever-growing list of plants under continuous Government inspection. Three lot inspection offices—New York, San Francisco, and Seattle—were established by the Bureau. These Bureau services are completely financed from funds contributed by industry recipients of such services and are voluntarily requested by 30 industry members.

The U.S. standards for fishery products upon which the service is based were increased by three. These products for which the standards were developed and promulgated are frozen cod fillets, frozen haddock fillets, and frozen halibut steaks. Product standards are developed in response to requests from the fishing industry.

Rough-fish market development.—The Bureau's intensive program of developing markets for underutilized fish continued. Markets for fish in the pet-food and mink-food industries were further expanded, with a salutary effect on a number of fresh-water and marine fisheries.

Consumer education.—On the October 13 "Don McNeil Breakfast Club Show" in Chicago, the "fish for health" message was beamed to some 30 million radio listeners over the 436 ABC affiliated radio stations in the United States and Canada and the Armed Forces Network. On this show the first announcement was made of a major "nutritional breakthrough," resulting from Bureau-sponsored research, which indicates the value of fishery products in lowering cholesterol levels in the blood.

To increase fish use by the military, Bureau contacts with the Army Quatermaster Corps were intensified during the past year. Information on the availability and nutritive value of fishery products was channeled to military purchasing agents through the Military Subsistence Supply Agency Newsletter. Bureau home economists also worked closely with military menu planners in an effort to get more fish items on the Military Master Menu.

Shrimp promotion.—The domestic shrimp industry, faced with a serious marketing problem, requested assistance in moving heavy supplies of frozen and canned shrimp. The Bureau cooperated with industry in an "all-out" sales push during the autumn and winter months. Shrimp was listed on the October plentiful foods list. It was featured during the national industrywide "Fish 'n Seafood Parade" and "October Shrimp Fiesta" sales promotions and listed in both as merchandising opportunities. The U.S. Department of Agriculture cooperated through its Food Trades Branch and Extension Service. This cooperative promotional effort had a salutary effort on shrimp inventories and prices.

Fish-cookery demonstrations.—Bureau home economists and marketing specialists conducted 91 fish-cookery demonstrations for supervisory school-lunchroom personnel and cooks and managers of school lunchrooms. As an example of the effect of industry followup on such demonstration programs, one Philadelphia distributor reported that his fish sales to schools had increased by some 800,000 pounds in the past year.

Fishery exhibits.—Recognizing that the support of national food-trade groups is vital to any cooperative industry-Government market-promotion program, this year the Bureau continued close liaison and cooperation with the leading national food trade associations. It sponsored public-service, fishery-educational exhibits at most of the national conventions of these groups. It had the distinct honor of being the first and only Government agency ever to be invited to

exhibit at the Super Market Institute Convention, the elite of food trade associations.

"Outdoor fish cookery," a Bureau-financed motion picture produced in 1958, was honored through "selection for showing" at the 1959 American Film Festival.

Market News Service expanded.—In 1959 several Market News Service field offices expanded their services. The coverage of the daily "Fishery Products Reports" at the Chicago, Ill., office was broadened to include prices of fresh-water fish fillets such as pickerel, lake trout, whitefish, yellow pike, and perch. The Chicago office reports that because of this new coverage, the number of subscribers to the daily report have increased. The fishery byproducts section of the report was expanded to include prices reported by Chicago brokers on various types of domestic and imported fish meal, solubles, and other marine products. The Chicago reports also began showing imports of fishery products entered through the Chicago Customs District.

The coverage of the daily "Fishery Products Reports" of the Boston Market News office was expanded to include the daily ex-vessel prices paid for fish at 21 fishing ports in Nova Scotia, New Brunswick, and Prince Edward Island. These data are obtained from the Canadian Department of Fisheries at Halifax.

The Baltimore Market News office commenced collecting and publishing data on fishery products imports entered at Baltimore, Md.

Fishery statistics.—A program was started for collecting, tabulating, and publishing data on the catch by Maine fishermen off the coast of Canada according to the areas in which the fish were taken. These data, together with figures on the catch by Massachusetts fishermen, enabled the Bureau to publish for the first time information on the total U.S. catch off Canada by area of capture.

Fisheries Loan Program.—By December 31, 1959, a total of 664 applications (for $21,060,646) for loans under this program had been received by the Office of Loans and Grants. Of these, 150 ($3,279,763) were received during the calendar year 1959. At the end of the year, 355 loans ($8,356,000) had been approved, and 26 applications ($2,626,000) were being processed. A total of 173 applications were declined, 57 were found to be ineligible, and 53 were withdrawn by the applicants.

Approximately 56 percent of the amount authorized was for refinancing of debts, 40 percent for vessel improvement or new vessels, and the balance for operating expenses. Approximately 42 percent of the funds were loaned to fishermen in the New England and Middle Atlantic area, 26 percent to California fishermen, 19 percent to fisher-

men in the South Atlantic and Gulf area, 9 percent to fishermen of the Pacific Northwest, and the balance to fishermen in Alaska, Hawaii, and the Great Lakes areas.

New Programs

The Bureau has initiated two programs that will directly benefit the fishing industry. A third program will have less direct effects.

Biological Research at San Diego

The Biological Laboratory at San Diego was established in the spring of 1959 to investigate tuna ecology and tuna fishing operations in the eastern Pacific. The prime purpose is to provide for the specific application of oceanographic and biological findings to the problems of the West Coast tuna fishing industry.

The research program consists of three principal investigations:

1. *Tuna forecasting* is concerned with securing the information about tuna and their environment that will help in understanding the causes and mechanisms of changes in tuna abundance and availability and eventually in predicting such changes. It is planned to produce 24 relief maps of the ocean floor of the eastern Pacific, incorporating all available sounding data, and also to prepare and distribute charts on monthly sea surface temperatures for the eastern Pacific. The latter will be a valuable service to the fishing industry.

2. *Operation research* was set up to develop an optimum fishing strategy based on the integrated experiences of several tuna fishing fleets and the results of biological and oceanographic research. The data of the Inter-American Tropical Tuna Commission were made available to this new laboratory for use as a starting point. A program is underway to use these data on tropical tunas to describe and measure success of fishing according to vessel size, area and season fishing, and changes such as those resulting from gear improvements. The results will be presented in a manner so that they will be useful to fishermen in planning and conducting operations.

3. *Tuna behavior studies* will be started as soon as resources permit. The purpose of the studies is to obtain information which will enable predictions to be made on the general distribution and availability of tuna. Such information will assist fishermen to converge more readily on areas where tuna are concentrated. Employing echo-ranging devices and sonic tags, the initial work will be on schooling behavior.

South Atlantic Explorations

The new South Atlantic fisheries exploration and gear research program began in August 1959. It entails exploratory fishing operations in the area from Cape Hatteras, N.C., to the Straits of Florida. The New England-type dragger *Silver Bay* is used for the operations. The purpose of the program is to aid the commercial fishing industry of the area by (1) exploring for new resources and fishing grounds, and (2) estimating the seasonal abundance, availability, and migration of possible commercial species.

Pesticide Studies

During the year, pesticide studies were started at three Bureau Laboratories—Milford, Conn.; Gulf Breeze, Fla.; and Galveston, Tex. This research is to determine the effect of pest control chemicals on marine organisms.

Meetings

Bureau officials took part in numerous fishery meetings, both in the United States and in foreign countries, during the past year. Many of these meetings concerned the resources and their conservation and development and others technological advances in industrial uses of fish. At some meetings Bureau representatives contributed scientific papers on their findings and learned of the advances made by others in their fields of science. Other meetings concerned improvements in fishing gear. There were several meetings primarily about marketing and trade problems. These the Bureau officials attended in the interests of the U. S. fishing industry. A number of meetings are mentioned in the section International Developments. Several others of interest are briefly discussed here.

The International Whaling Commission held its annual meeting in London from June 22 to July 1. A Bureau representative served as adviser to the U.S. Commissioner. Quotas for Antarctic whaling were established for the coming season, but the withdrawal of three (Netherlands, Norway, and Japan) of the five Antarctic whaling countries threatened the further existence of the Commission.

The Bureau was represented by a fishery adviser on the U.S. delegation to the 10th session of the Food and Agriculture Organization of the United Nations (FAO) Conference, held in Rome during November 1959. This Conference established the program of work that FAO will conduct in 1960 and 1961. Two U.S. proposals—one for a "World Conference on Biology of the Tunas and Related Species" and the other for a "World Symposium on the Nutritive Value

of Fishery Products"—were incorporated into the program of work for the Fisheries Division of FAO.

The second World Fishing Boat Congress, under the auspices of the FAO, was assembled in Rome, April 5–10, 1959. Delegates from 35 nations were present. The Bureau of Commercial Fisheries was represented by four staff members. Several industry members and naval architects from the United States were registered at the meeting. The proceedings published in book form by the FAO form the second volume of a series on fishing-boat design and construction. This series constitutes the only comprehensive source of information covering all aspects of fishing-vessel design and construction problems.

The 10th Congress of the International Institute of Refrigeration was held in Copenhagen, Denmark, from August 18 to 26. Over 1,500 people from 46 countries attended the Congress. There were nine different Commission meetings concerning various aspects of refrigeration activities. The Bureau's representative, a specialist in the refrigeration preservation of fish, presented a paper on trawler-frozen fish. There were informative and challenging papers ranging from objective tests for the quality of fishery products to dehydro-freezing and dielectric heating and thawing. This meeting, which is held every 2 years, afforded the Bureau an opportunity to learn, firsthand, of refrigeration research and applications being made in countries all over the world. The 1962 meeting will be held in Washington, D.C.

The 10th annual meeting of the Pacific Fisheries Technologists was held at Sacramento, Calif., March 22–25, 1959. Approximately 80 members were present. This is one of the most effective meetings attended by Bureau personnel. Easy and informal communication with similarly trained technical personnel from industry ensures rapid utilization of technological research findings. Equally valuable is the opportunity to discuss new industry problems. Highlight of the meeting was a symposium on the status of scientific knowledge on the oxidative mechanisms which give rise to the objectionable "fishy" odors of deteriorated fish oils. Other highly valuable discussions dealt with the occurrence of steatites in cats fed unstabilized red meat from tuna. This has been found to be due to a vitamin E deficiency. Vitamin E is now added to all canned pet foods derived from tuna.

Cooperation and Coordination With International, Federal, State, and Other Agencies

In the interest of fostering a greater exchange of ideas and research results and the best use of available manpower and facilities, the Bureau cooperates with and coordinates its programs with those of

various foreign governments, other Federal agencies, States, universities, and private agencies. This is accomplished through international agreements and treaties, formal and informal agreements with Federal and State agencies, and contracts and informal arrangements with State conservation departments, universities, and private associations.

The Bureau's research efforts are coordinated with those of other countries through the international organizations: the International North Pacific Fisheries Commission (INPFC), the Great Lakes Fishery Commission, the International Commission for the Northwest Atlantic Fisheries (ICNAF), and the Food and Agriculture Organization of the United Nations (FAO).

The terms of formal agreements with States are carried out to a large extent by established commissions. These commissions facilitate cooperation between the Bureau and the States. They also encourage the coordination of research activities. Two such commissions are the Atlantic States Marine Fisheries Commission and the Gulf States Marine Fisheries Commission. Much of the scientific data upon which these interstate commissions act is provided by Bureau researchers.

The Bureau also cooperates closely with a number of national, regional, and local fishery and allied trade associations.

Formal and informal agreements exist between the Bureau and other Federal Government agencies, such as the Atomic Energy Commission (AEC), Federal Trade Commission, Department of State, Department of Health, Education, and Welfare, Department of Agriculture, Weather Bureau, and various defense agencies.

During the summer of 1959, the Bureau's research vessel *John N. Cobb* in cooperation with AEC explored the Chukchi Sea, which is within the Arctic Circle north of the Bering Straits. AEC investigated the feasibility of an experimental harbor-blasting project off Cape Thompson on the eastern shore of the Sea in connection with its program of developing peaceful uses for atomic energy. The Bureau explored for commercial fishery resources, collected biological and oceangraphic data, and made observations on bird and mammal life of the area. The results, when analyzed and catalogued, should contribute immensely to the basic knowledge of the area and the Arctic in general and should provide AEC with desired background material.

A Memorandum of Understanding between the Bureau of Commercial Fisheries and the Federal Trade Commission regarding fishery cooperative marketing practices was negotiated and approved by the two agencies on April 8, 1959. The Federal Trade Commis-

sion agreed to notify the Bureau of Commercial Fisheries prior to the initiation of any investigation of complaints regarding restraint of trade by a fishery cooperative. The Bureau, in turn, agreed to provide the Commission with current lists of fishery cooperatives and to notify the Commission of any investigation the Bureau might propose to make pursuant to the provisions of the Fishery Cooperative Marketing Act.

The U.S. Coast Guard cooperates with the Bureau in the enforcement of laws and regulations implementing fishery treaty obligations of the United States.

In addition to the Columbia River Fishery Development, the Bureau has cooperative arrangements with the Bureau of Reclamation, Corps of Engineers, and other State and Federal agencies in the Columbia River Basin.

Cooperative arrangements with the Navy, Weather Bureau, Civil Aeronautics Administration, Public Health Service, and the State of Alaska are necessary to manage the Pribilof Islands fur seal herd and maintain the two native communities there.

To supplement the research and services conducted by Bureau personnel, use was also made of the professional staff and facilities of a number of universities, State agencies, trade associations, and private organizations, through Bureau-sponsored contracts. These contractual arrangements were mutually beneficial. The Bureau was able to utilize the services of highly skilled professsional talent in these cooperating organizations. At the same time, these cooperators were able to expand their research in fishery matters. Appendix C is a list of the organizations with which the Bureau had formal contractual arrangements in 1959.

Organization, Employment, Budget, and Physical Property

Organization

In 1959 the organization of the Headquarters Office of the Bureau of Commercial Fisheries in Washington, D.C., remained unchanged except that the Branch of Sea Mammals in the Division of Resource Management became the Branch of Marine Mammals (Appendix D). The Office of Loans and Grants continued to be under the supervision of the Division of Industrial Research and Services.

In the field the organizing continued. All offices other than regional or area offices were defined as field stations. Field research stations were defined at each level; the official title of the officer in

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charge of each class of research station was designated; and the main research stations were classified. This classification follows:

Biological Laboratory.—This name is used for Bureau field stations which are major research centers engaged in biological research. The full title is "Bureau of Commercial Fisheries Biological Laboratory." The laboratory head is called "Laboratory Director."

Each of the laboratories at the following locations is designated as a Bureau of Commercial Fisheries Biological Laboratory:

Juneau, Alaska
La Jolla, Calif.
San Diego, Calif.
Stanford, Calif.
Milford, Conn.
Washington, D.C.
Gulf Breeze, Fla.
Brunswick, Ga.
Honolulu, Hawaii
Boothbay Harbor, Maine
Woods Hole, Mass.
Annapolis, Md.
Ann Arbor, Mich.
Beaufort, N.C.
Galveston, Tex.
Seattle, Wash.

An exception is the Ichthyological Investigation at Washington, D.C., which performs a specialized function of national scope. It is renamed "Ichthyological Laboratory."

Investigations.—The word "Investigations" is used for major activities within a Biological Laboratory, in charge of which is a "Chief."

The scope of Biological Laboratories is broadened to eliminate "Branch" lines. Any fishery biological research problem within the geographical area of a laboratory and the scope of staff competence may be assigned to that laboratory.

Technological Laboratory.—This name is used for Bureau field stations which are major research centers engaged in technological activities. The full title is "Bureau of Commercial Fisheries Technological Laboratory." The laboratory head is called "Laboratory Director."

Each of the laboratories at the following locations is designated as a Bureau of Commercial Fisheries Technological Laboratory:

Ketchikan, Alaska
Boston, Mass.
College Park, Md.
Pascagoula, Miss.
Seattle, Wash.

Technological Station.—This name is used for Bureau field stations which are minor research or advisory centers engaged in technological activities. The full title shall be "Bureau of Commercial Fisheries Technological Station." The station head is called "Chief."

Each of the field stations at the following locations is designated as a Bureau of Commercial Fisheries Technological Station:

Terminal Island, Calif.
Ann Arbor, Mich.

Exploratory Fishing and Gear Research Base.—This name is used for Bureau field stations which are major centers engaged in exploratory fishing activities and/or gear research. The full title is "Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base." That person formerly designated as "Chief" is known as "Base Director."

Each of the bases at the following locations is designated as a Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base:

Gloucester, Mass.
Pascagoula, Miss.
Seattle, Wash.

Exploratory Fishing and Gear Research Station.—This name is used for a Bureau field station which is a research or advisory center engaged in exploratory fishing and/or gear research activities and which is not known as an "Exploratory Fishing and Gear Research Base." The full title is "Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Station." The station head is called "Chief."

There are two Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Stations—at Miami, Fla., and Ann Arbor, Mich.

The five Regions and two areas in the field organization of the Bureau of Commercial Fisheries and the territory included in each are shown in figure 1.

Employment

The total employment for the Bureau of Commercial Fisheries averaged 1,716 throughout calendar year 1959. Of this total average, 1,461 were permanent and 255 were seasonal employees. The peak employment for the year was reported at the end of July, at which time there were 1,452 permanent and 668 seasonal employees, making a total of 2,120. The variations in the number of employees throughout the year and the relationship between the total number and the number of permanent employees and seasonal, or temporary, employees are shown in figure 2.

Of the total of 1,554 permanent employees reported as of October 31, 1959, 667 were classified in 32 professional and technical series; 171 in 14 subprofessional series; 351 in 32 administrative and clerical series; and 365 were in positions for which the pay is determined outside of the Classification Act (124 vessel employees, 61 custodial employees, and 180 Aleuts). The grade structures for the professional and technical series and the clerical and administrative series and the number of employees in each grade in these two classifications are shown in figures 3 and 4.

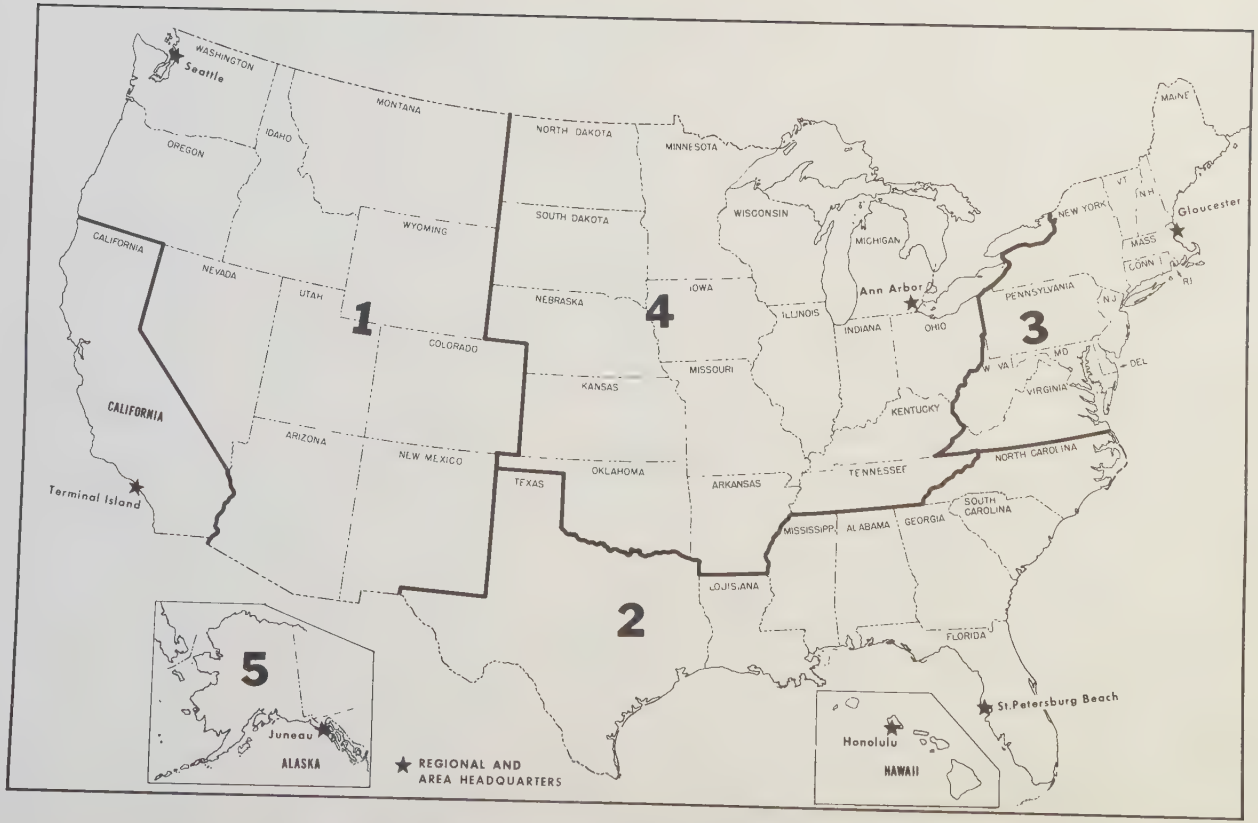

FIGURE 1.—Regions and areas, Bureau of Commercial Fisheries.

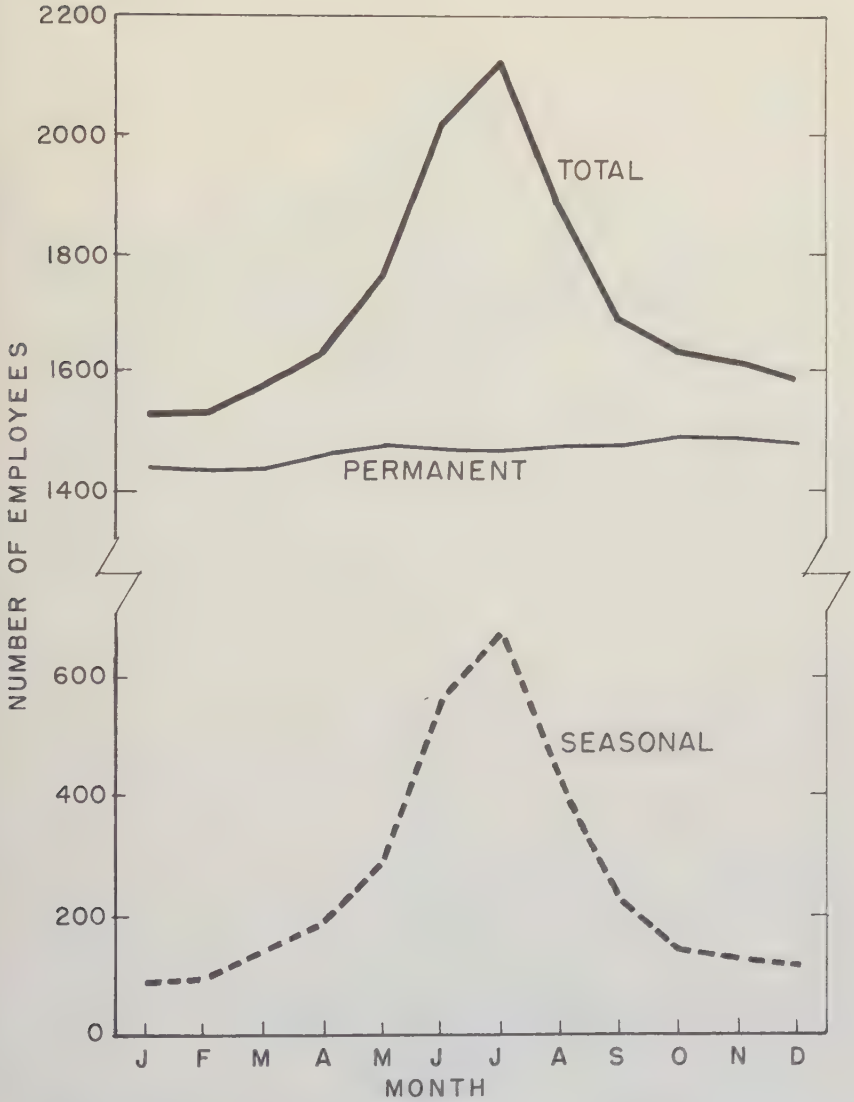

FIGURE 2.—Bureau of Commercial Fisheries employment totals, calendar year 1959.

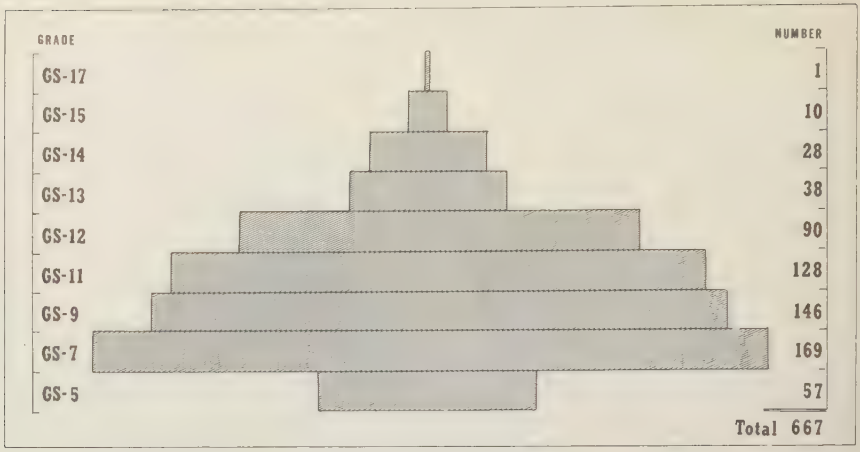

FIGURE 3.—Distribution by grade of professional and technical employees, Bureau of Commercial Fisheries, October 31, 1959.

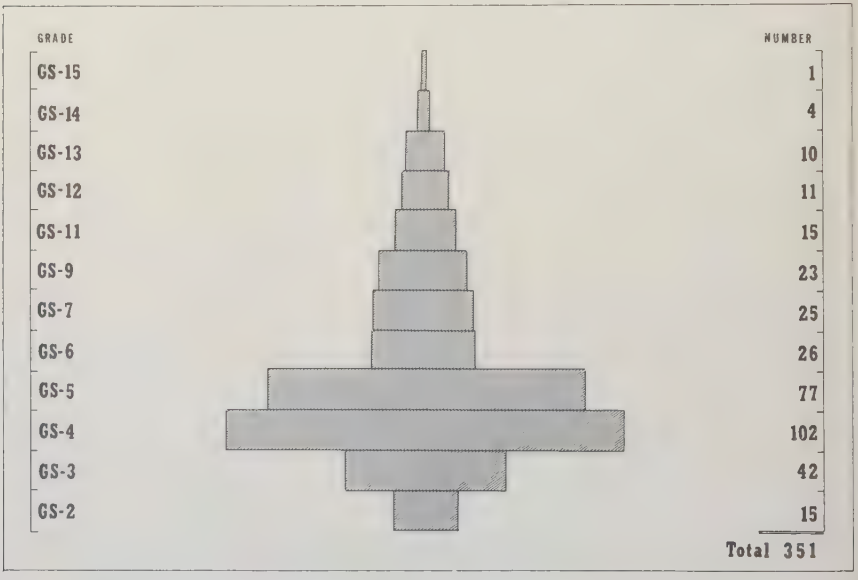

FIGURE 4.—Distribution by grade of clerical and administrative employees, Bureau of Commercial Fisheries, October 31, 1959.

Budget

For the fiscal year 1959, $18.5 million were available to carry out the Bureau's program (Appendix E). Of this amount, $9.4 million were from annual regular appropriations; $5 million from Public Law 466 (known as the Saltonstall-Kennedy) funds; $3 million from funds transferred by the Corps of Engineers and the State Department.

Physical Property

Field laboratories and stations, vessels, and installations on the Pribilof Islands are the principal physical properties of the Bureau (Appendix F). In the calendar year 1959, there were 24 large laboratories and installations, 63 smaller stations and offices, and 35 vessels of 40 feet and longer. Space for four of the principal laboratories was acquired during the year, at San Diego and Terminal Island, Calif., and at Jackson Place and the U.S. National Museum in Washington, D.C. Three field research stations were put into operation, at Vineyard Haven, Mass., Marquette, Mich., and Kasitsna Bay, Alaska. Space was provided for one statistical and market news field office at Morgan City, La., and two statistical field offices at Salisbury, Md., and Ann Arbor, Mich.

Publications

Publishing is the principal medium by which the Bureau communicates to the public, and particularly the fishing industry, the results of its research and service type activities. Its published articles cover many fields that are associated with the fisheries—biology, chemistry, economics, engineering, marketing, and statistics. An increasing effort is being made to strengthen the publishing program so that prompt communication can be made with fellow workers in the various fields of interest and with the general public.

Exclusive of the 5 times-a-week Fishery Products Reports issued by the seven Market News Service field offices, a total of 780 publications (13,831 pages) were sponsored by the Bureau in 1959.

Of these, 568 reports were published by the Fish and Wildlife Service Series; the remaining 212 appeared in non-Service journals and series. Most articles were authored by Bureau personnel; a few were written by unpaid collaborators or members of research institutes under contract.

An examination of the 1959 publications indicates that 44 percent are statistical reports of special interest to the fishing industry; 36

percent are scientific contributions; 14 percent are for industrial and commercial audiences; and 6 percent present popular information for the general public.

Appendix G presents a description and partial list of the 1959 publications.

Appendix A—Fisheries of the United States

A–1.—*Employment, fishing craft, and establishments, calendar years 1959 and 1958*

Item	1959	1958
Persons employed:		
Direct:	*Number*	*Number*
Fishermen	128,985	138,960
Transporters	2,251	2,022
Shore workers	92,650	97,604
Indirect:		
Allied industries (gear, manufacture, boat building, processing equipment, etc.).	310,000	310,000
Total	533,886	538,586
Craft utilized:		
Fishing:		
Vessels (5 net tons and over)	12,109	11,496
Motor boats	54,735	54,821
Other boats	8,457	8,974
Transporting:		
Vessels (5 net tons and over)	883	479
Motor boats	282	347
Total	76,466	76,117
Vessels documented for fishing for the first time during the year	479	684
Fishing shore establishments:		
Pacific Coast States	[1] 566	541
Atlantic Coast and Gulf States	2,934	2,976
Great Lakes and Mississippi River States	872	885
Total	4,372	4,402

[1] Includes Hawaii plants.

A–2.—*U.S. catch, calendar years 1959, 1958, and record year*

Species	1959		1958		Record catch	
	Million pounds	*Million dollars*	*Million pounds*	*Million dollars*	*Year*	*Million pounds*
Menhaden	2,203	26	1,549	22	1959	2,203
Tuna	286	37	319	43	1950	391
Industrial fish [1]	248	3	229	3	1959	248
Shrimp	240	58	214	73	1954	268
Salmon	202	36	307	46	1936	791
Crabs	175	15	166	12	1959	175
Ocean perch (Atlantic)	137	6	149	6	1951	258
Flounders	122	13	125	12	1948	139
Herring, sea:						
Atlantic	121	2	179	3	1902	201
Pacific	115	1	100	1	1937	263
Whiting	115	2	111	3	1957	133
Haddock	113	11	120	12	1929	294
Sardines, Pacific	74	1	207	5	1936	1,502
Oysters	65	29	66	30	[2] 1908	152
Cod	60	4	54	4	1880	308
Halibut	54	8	48	8	1915	67
Alewives	51	1	76	1	1908	90
Clams	45	12	36	11	1951	43
Mullet	41	2	43	3	1902	43
Jack mackerel	38	1	22	1	1952	147
Mackerel, Pacific	38	1	28	1	1935	146
Anchovies	7	[3]	12	[3]	1953	86
Other	572	77	576	71	----	----
Total	5,122	346	4,736	371	----	----

[1] Unclassified species used for bait, reduction, and mink food.
[2] First year in which an oyster survey was made in all regions.
[3] Less than one-half million dollars.

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A–3.—*Summary of manufactured fishery products by quantity and value, calendar years 1959 and 1958*

Item	1959		1958	
	Quantity	Value	Quantity	Value
Packaged products, fresh and frozen:				
Fish:	*Thousand pounds*	*Thousand dollars*	*Thousand pounds*	*Thousand dollars*
Not breaded:				
Fillets and steaks, raw	147,248	46,174	155,885	51,230
Other (includes whale meat for animal feeding).	6,285	1,434	4,556	666
Breaded, raw and cooked:				
Sticks	60,377	28,611	61,011	27,000
Fillets, portions, and pan-dressed	37,956	13,377	28,960	11,063
Shellfish:				
Not breaded	172,355	119,702	163,809	124,046
Breaded	82,610	56,960	71,973	52,541
Fish and shellfish specialties	20,776	14,353	26,393	17,980
Total fresh and frozen	527,607	280,611	512,587	284,526
Canned:				
Fish and shellfish for human consumption:				
Tuna	282,192	159,143	277,131	161,793
Salmon	118,330	71,827	179,134	92,822
Sardines:				
Maine (sea herring)	41,024	14,902	49,139	15,874
Pacific	33,956	5,399	100,016	16,497
Mackerel	26,407	4,235	18,199	2,657
Clam products and specialties	48,085	13,640	48,444	13,021
Shrimp and specialties	14,010	16,999	14,554	20,885
Oysters and specialties	12,959	7,623	12,056	7,247
Squid	15,505	1,378	5,043	414
Other	35,123	15,116	34,453	14,406
Total for human consumption	627,591	310,262	738,169	345,616
Bait and animal food:				
Animal food	346,102	37,077	360,156	41,959
Salmon eggs for bait	883	912	927	1,007
Total bait and animal food	346,985	37,989	361,083	42,966
Total canned	974,576	348,251	1,099,252	388,582
Cured fish and shellfish:				
Salted	41,338	16,721	40,224	15,374
Smoked	29,650	23,316	34,563	25,764
Dried shrimp and cod (lutefisk)	1,634	582	474	519
Total cured	72,622	40,619	75,261	41,657
Industrial products:				
Meal and scrap	613,102	35,926	496,280	31,759
Oil, body and liver	187,334	13,092	165,210	12,333
Fish solubles and homogenized-condensed fish	330,717	10,043	260,354	11,519
Oyster-shell lime and poultry grit	798,676	4,937	862,342	4,719
Mussel-shell lime and poultry grit	21,070	75	21,350	65
Marine pearl-shell and mussel-shell buttons	[1] 2,770	4,313	[1] 4,144	6,577
Other		13,830		12,911
Total industrial products		82,216		79,883
Grand total		751,697		794,648

[1] Number of gross manufactured buttons.

A–4.—*Foreign trade in fishery products by quantity and value, calendar years 1959 and 1958*

Item	1959		1958	
	Quantity	Value	Quantity	Value
Imports:	*Thousand pounds*	*Thousand dollars*	*Thousand pounds*	*Thousand dollars*
Edible:				
Fresh or Frozen:				
Fresh-water (not fillets)	39,723	13,449	42,074	13,684
Salt-water (not fillets)	376,259	51,800	318,743	48,930
Groundfish and ocean perch fillets	184,837	38,759	146,589	30,431
Other fillets	64,802	21,012	62,688	22,000
Shrimp	106,555	52,306	85,394	43,162
Lobsters:				
Common	20,635	13,802	21,413	13,474
Spiny	28,092	24,833	25,938	22,187
Other shellfish	12,412	4,389	11,865	3,986
Canned:				
Salmon	31,154	11,130	29,226	11,271
Sardines	22,163	8,370	28,156	8,564
Tuna	56,134	21,688	46,204	16,882
Crabmeat	7,304	7,947	5,854	6,116
Other	67,045	23,524	55,076	19,513
Cured, dried, pickled, or salted	81,201	13,747	82,749	13,248
Smoked or kippered	6,299	1,394	4,991	1,090
Other	9,009	2,883	24,519	5,674
Total edible	1,113,624	311,033	991,479	280,212
Nonedible:				
Fish and marine animal oils	[1] 6,566	5,739	[1] 10,980	9,149
Fish meal and scrap	[2] 133	15,884	[2] 100	11,335
Other		33,844		26,475
Total nonedible		55,467		46,959
Grand total, imports		366,500		327,171
Exports:				
Edible:				
Fresh or frozen	12,655	4,283	24,230	4,119
Canned:				
Mackerel	743	135	2,308	333
Salmon	13,826	10,639	9,227	6,669
Sardines	38,724	6,136	18,461	3,395
Other	13,236	4,736	9,875	4,133
Total canned	66,529	21,646	39,871	14,530
Cured	1,005	624	893	565
Other	499	194	474	226
Total edible	80,688	26,747	65,468	19,440
Nonedible:				
Fish and marine animal oil	146,009	12,044	95,318	7,896
Other		5,451		3,668
Total nonedible		17,495		11,564
Grand total, exports		44,242		31,004

[1] In thousand gallons.
[2] In thousand tons.

Appendix B—New Legislation

Amendment to the Black Bass Act

16 U.S.C., 1958 Ed., Supp. I, 855

Clarifies a provision of the Black Bass Act to insure the legality of shipping fish or eggs for breeding or stocking purposes if they were acquired and handled in accordance with State law.

73 Stat. 430; Public Law 86–207; Act of August 25, 1959.

Amendment to Act Authorizing Study of Effect of Insecticides on Fish and Wildlife

16 U.S.C., 1958 Ed., Supp. 1, 742–1 Note

Increases the annual sum authorized to be appropriated from $280,000 to $2,565,000 for comprehensive continuing studies on the effects of insecticides, herbicides, fungicides, and pesticides upon the fish and wildlife resources of the United States.

73 Stat. 563; Public Law 86–279; Act of September 16, 1959.

Study of Migratory Game Fish

16 U.S.C., 1958 Ed., Supp. 1, 760e–769g

Authorizes and directs the Secretary to undertake a comprehensive continuing study of migratory marine game fish to determine migrations, identity of stocks, growth rates, mortality rates, variations in survival, etc. for the purpose of developing wise conservation policies and constructive management activities.

73 Stat. 642; Public Law 86–359; Act of September 22, 1959.

In addition to the legislation enacted as listed above, further operating authority under existing law was acquired by the Bureau through a memorandum of understanding which is described as follows:

Fishery Attaché Program, Executive Order No. 10249, June 4, 1951, 16 F.R. 5309, and Memorandum of Understanding Between the Departments of State and Interior With Respect to the Minerals and Fisheries Officer Program, dated May 5, 1959.

16 U.S.C. 742d
16 U.S.C. 742e(c)
22 U.S.C. 846
22 U.S.C. 846 Note

Recognizing its responsibility to service the foreign reporting needs of other Federal Agencies and the particular needs of the Department of the Interior in the fisheries field, the Department of State, in consultation with the Department of the Interior and other interested Government agencies, is developing appropriate schedules and more comprehensive guidance materials for minerals and fisheries reports. The Department of State has also agreed to request funds for Fisheries and Minerals Officer positions at those posts which are determined by the Department of State, in consultation with the Department of the Interior, to require such positions. These Officers are responsible for discharging in their respective fields the economic and technological reporting requirements for the country in which they are stationed. To date, Fishery Attaches have been appointed in Tokyo, Japan, and Mexico City, Mexico.

60 Stat. 1002; Public Law 724, 79th Cong.; Act of August 13, 1946.
70 Stat. 1121; Public Law 1024, 84th Cong.; Act of August 8, 1956.

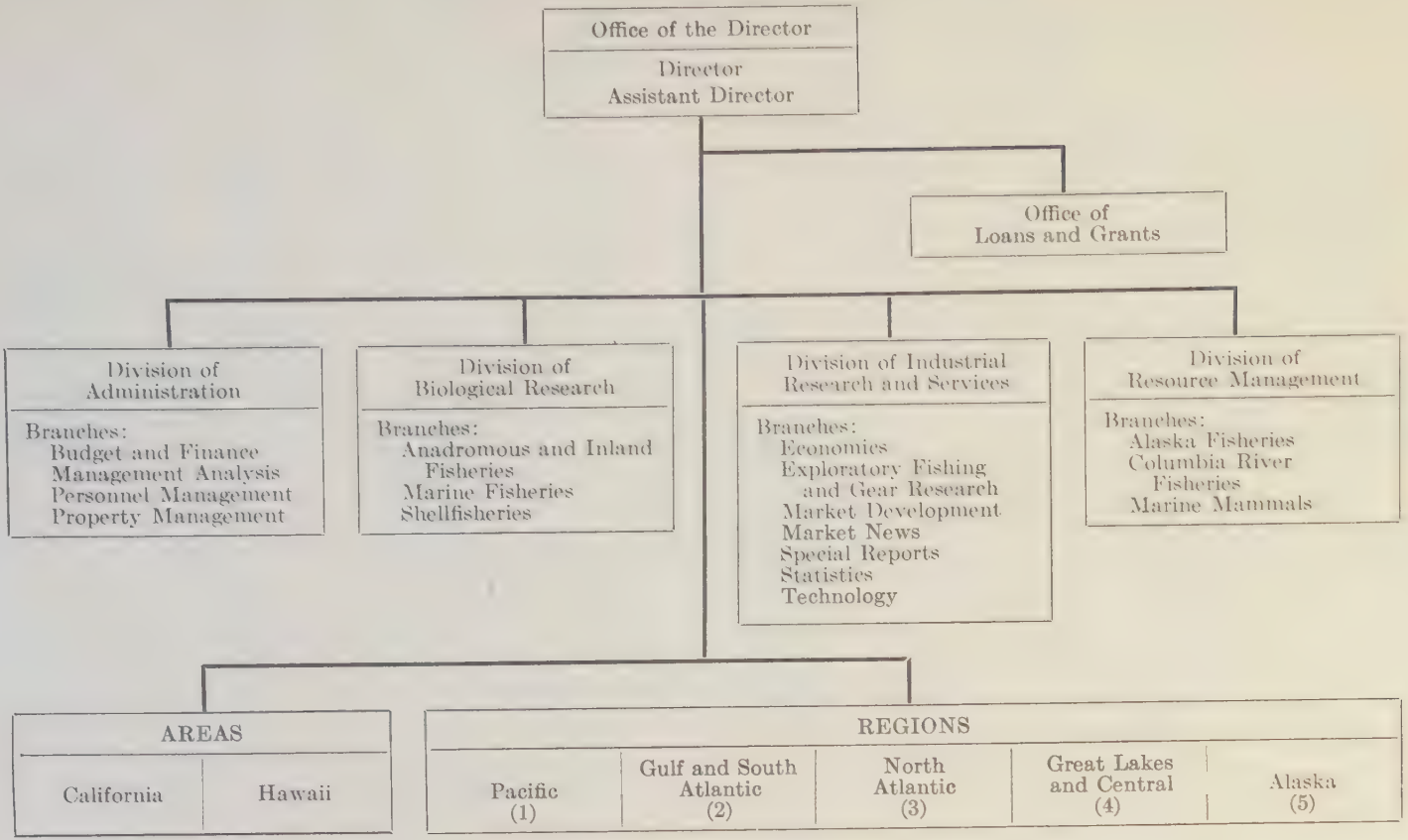
Appendix C—Organizations With Which the Bureau Had Contracts in 1959

Organization	*Location*
A. J. Wood and Company	Philadelphia, Pa.
Alaska Department of Fisheries	Juneau, Alaska
Barkley and Dexter Laboratories	Fitchburg, Mass.
Boston College (Bureau of Business Research)	Boston, Mass.
California, University of	Davis, Calif.
California, University of	Berkeley, Calif.
Craven Film Corp	New York, N.Y.
Dairy Laboratories	Washington, D.C.
De Frenes Corp	Philadelphia, Pa.
Delaware, University of	Newark, Del.
Duke University	Durham, N.C.
Eastern Traffic Bureau, Inc	New York, N.Y.
Florida, University of	Gainesville, Fla.
Florida State University	Tallahassee, Fla.
Food Chemical and Research Laboratories, Inc	Seattle, Wash.
Gulf Coast Research Laboratory	Ocean Springs, Miss.
Hartley Productions	New York, N.Y.
Idaho Department of Fish and Game	Boise, Idaho
Lime Crest Research Laboratory	Newton, N.J.
Maine Department of Sea and Shore Fisheries	Augusta, Maine
Maryland, University of	College Park, Md.
Maryland State College	Princess Anne, Md.
Massachusetts Division of Marine Fisheries	Boston, Mass.
Miami, University of (Marine Laboratory)	Coral Gables, Fla.
Michigan, University of	Ann Arbor, Mich.
Minnesota, University of (Hormel Institute)	Austin, Minn.
National Fisheries Institute	Washington, D.C.
North Carolina, University of	Chapel Hill, N.C.
Oklahoma, University of	Norman, Okla.
Oregon Fish Commission	Portland, Oreg.
Oyster Institute of North America	Annapolis, Md.

Appendix C—Organizations With Which the Bureau Had Contracts in 1959—Continued

Organization	*Location*
Philip R. Park Foundation	San Pedro, Calif.
Rutgers University	Brunswick, N.J.
Sam Johnson and Sons, Inc	Duluth, Minn.
San Diego State College (Bureau of Business and Economic Research).	San Diego, Calif.
Scripps Institution of Oceonography	La Jolla, Calif.
Skinner and Sherman, Inc	Boston, Mass.
Southern California, University of	Los Angeles, Calif.
Strasburger and Siegel, Inc	Baltimore, Md.
Texas A. and M. Research Foundation	College Station, Tex.
Truesdail Laboratories	Los Angeles, Calif.
U.S. Bureau of Labor Statistics	Washington, D.C.
Virginia Fisheries Laboratory	Gloucester Point, Va.
Washington, University of	Seattle, Wash.
Washington University of (Fisheries Research Institute).	Seattle, Wash.
Washington State Department of Fisheries	Seattle, Wash.
Washington State Department of Game	Seattle, Wash.
Wisconsin, University of	Madison, Wis.
Woods Hole Oceanographic Institute	Woods Hole, Mass.

Appendix D—Organization Chart



Appendix E—Budget for Fiscal Year 1959

Function	Appropriations					Transferred funds			Advances and contributed funds [2]	Total
	Management and investigations of resources	Construction	General administrative expenses	Administration of Pribilof Islands	Promote and develop fisheries [1]	Corps of Engineers: Operation and maintenance	Corps of Engineers: Construction	State Department: Passamaquoddy studies		
Management	$142,900								$3,800	$146,700
Marketing and technology	1,473,250				$2,320,870				111,911	3,906,031
Research	3,162,400				2,395,085			$52,600	824,691	6,434,776
Research on fish migration over dams	289,400									289,400
Administration of Alaska fisheries	1,620,481									1,620,481
Construction and land acquisition		$500,000								500,000
General administrative services	36,690		$319,732		293,240	$49,200	$50,400		32,500	781,762
Administration of Pribilof Islands				$1,641,000						1,641,000
Fur seal research				210,500						210,500
Fisheries Advisory Committee					26,000					26,000
Lower Columbia River:										
Operation and maintenance						1,365,800				1,365,800
Construction							1,549,600			1,549,600
Total	6,725,121	500,000	[3] 319,732	1,851,500	5,035,195	1,415,000	1,600,000	52,600	972,902	18,472,050

[1] Funds made available under Public Law 466, 83d Cong. (known as the Saltonstall-Kennedy Act of 1954).

[2] Includes $779,775 from the Great Lakes Fishery Commission, $70,046 from the Inspection and Grading of Fishery Products program, $65,225 from the State of California Marine Research Committee, and other amounts from various sources.

[3] Includes $132,200 comparative transfer from Bureau of Sport Fisheries and Wildlife.

Appendix F—Physical Properties

F–1.—*Principal laboratories and installations, calendar year 1959*

Location	Type	Principal use	Gross valuation [1]
Alaska:			
Juneau	Biological Laboratory, warehouse and shops.	Vessel maintenance and biological research, loans and grants.	[3] $212,000
Ketchikan	Technological Laboratory	Technological research	175,000
Pribilof Islands	Fur seal processing facilities and native villages.	Management of Alaska fur seals	2,327,000
California:			
La Jolla	Biological Laboratory	Biological research	[2]
San Diego	do	do	[2]
Stanford	do	do	[2]
Connecticut, Milford	do	do	80,000
District of Columbia:			
734 Jackson Pl. NW	do	do	[2]
U.S. National Museum.	do	do	[2]
Florida, Gulf Breeze	do	do	75,000
Georgia, Brunswick	do	do	[2]
Hawaii, Honolulu	do	Biological research, loans and grants.	314,000
Maine, Boothbay Harbor	do	Biological research, exploratory fishing and gear research.	[3] 110,000
Maryland:			
Annapolis	do	Biological research	[2]
College Park	Technological Laboratory	Technological research, home economics.	81,000
Massachusetts:			
East Boston	do	Technological research, loans and grants.	[2]
Gloucester	Exploratory Fishing and Gear Research Base.	Exploratory fishing and gear research.	[2]
Woods Hole	Biological Laboratory	Biological research	364,000
Michigan, Ann Arbor	Biological Laboratory, Technological Station, Exploratory Fishing and Gear Research Station.	Biological and technological research, exploratory fishing and gear research, market development.	[2]
Mississippi, Pascagoula	Exploratory Fishing and Gear Research Base, Technological Laboratory.	Exploratory fishing and gear research, loans and grants, market development, biological and technological research.	40,000
North Carolina, Beaufort	Biological Laboratory	Biological research, statistics	156,000
Texas, Galveston	do	Biological research	[2]
Washington, Seattle	Biological Laboratory, Technological Laboratory, Exploratory Fishing and Gear Research Base, dock and warehouse.	Biological and technological research, exploratory fishing and gear research, Pribilof Islands supply.	[3] 122,000
Puerto Rico, Mayaguez	Technological Laboratory	On loan to University of Puerto Rico.	27,000

[1] Figures shown are original acquisition or construction costs.
[2] Installation not owned by Bureau of Commercial Fisheries. Includes property held under leases, cooperative agreements, and use permits.
[3] Installations at this location are both owned and leased by Bureau of Commercial Fisheries.

F–2.—*Minor field research stations, market news offices, exploratory fishing stations, market development offices, and statistical offices, calendar year 1959*

Location	Type	Principal use	Gross valuation [1]
Alabama:			
Bayou LaBatre	Statistical and Market News Field Office.	Statistics and market news reporting.	(2)
Decatur	Field Research Station	Biological research	(2)
Alaska:			
Brooks Lake	do	do	$21,000
Karluk Lake	do	do	(3)
Kasitsna Bay	do	do	(3)
Little Port Walter	do	do	18,000
California:			
Mill Creek	do	do	29,000
San Pedro	Market News and Statistics Office.	Market news reporting, statistics	(2)
Terminal Island	Market Development Office, Technological Station.	Market development, Technological research.	(2)
Delaware, Millville	Field Research Station	Biological research	(2)
Florida:			
Apalachicola	Statistical and Market News Field Office.	Statistics and market news reporting.	(2)
Fort Meyers	do	do	(2)
Jacksonville	Market Development Office	Market development	(2)
Key West	Statistical and Market News Field Office.	Statistics and market news reporting.	(2)
Miami	Exploratory Fishing and Gear Research Station, Statistical Field Office.	Exploratory fishing and gear research; biological research.	(2)
St. Petersburg	Field Research Station	Biological research	(2)
Tampa	Statistical and Market News Field Office.	Statistics and market news reporting.	(2)
Georgia, Brunswick	Statistical Field Office	Statistics	(2)
Illinois, Chicago	Market News Office	Market news reporting	(2)
Louisiana:			
Empire	Statistical Field Office	Statistics	(2)
Galiano	do	do	(2)
Houma	Statistical and Market News Field Office.	Statistics and market news reporting.	(2)
Morgan City	do	do	(2)
New Orleans	Market News and Statistics Office.	do	(2)
Maine:			
Eastport	Field Research Station	Biological research	(2)
Portland	Field Office	Statistics, market news, biological research.	(2)
Rockland	do	do	(2)
West Boothbay Harbor.	Statistical Field Office	Statistics	(2)
Maryland:			
Annapolis	do	do	(2)
Salisbury	do	do	(2)
Massachusetts:			
Boston	Market News Office	Market news reporting, statistics, biological research.	(2)
Gloucester	Market Development Office, Field Office.	Market development, statistics, biological research, market news.	(2)
New Bedford	do	Market development, statistics, biological research, market news reporting.	(2)
Provincetown	Statistical Field Office	Statistics, market news reporting	(2)
Vineyard Haven	Field Research Station	Biological research	(2)
Michigan:			
Ann Arbor	Statistical Field Office	Statistics	(2)
Ludington	Field Research Station	Biological research	(2)
Marquette	do	do	(2)
Northville	Field Office	do	(2)
Rogers City	Field Research Station	do	(2)
Mississippi, Ocean Springs.	Statistical Field Office	Statistics	(2)
New Jersey, Toms River	do	do	(2)
New York:			
Bayport	do	do	(2)
New York City	Market News Office Market Development Office.	Market news reporting Market development	(2)
Ohio, Sandusky	Field Station	Biological research, exploratory fishing and gear research.	(2)
Oregon, Astoria	Statistical Field Office	Statistics	(2)

F–2.—*Minor field research stations, market news offices, exploratory fishing stations, market development offices, and statistical offices, calendar year 1959*—Continued

Location	Type	Principal use	Gross valuation [1]
Rhode Island:			
Kingston	Field Research Station	Biological research	(2)
Point Judith	do	do	(2)
Warren	Statistical Field Office	Statistics	(2)
South Carolina, Charleston	do	do	(2)
Tennessee, Milan	do	do	(2)
Texas:			
Aransas Pass	Market News and Statistical Field Office.	Statistics and market news	(2)
Brownsville	do	do	(2)
Fort Worth	Market Development Office	Market development	(2)
Freeport	Market News and Statistical Field Office.	Statistics and market news	(2)
Galveston	do	do	(2)
Virginia:			
Franklin City	Field Research Station	Biological research	(2)
Hampton	Market News Office	Market news reporting	(2)
Weems	Statistical Field Office	Statistics	(2)
Washington:			
North Bonneville	Field Research Station	Biological research	(2)
Seattle	Market News and Statistical Office.	Market news reporting, statistics, loans and grants.	(2)
	Market Development Office	Market development	(2)
Wisconsin:			
Aconto	Field Research Station	Biological research	(2)
Ashland	do	do	(2)

[1] Figures shown are original acquisition or construction costs.
[2] Installation not owned by Bureau of Commercial Fisheries. Includes property held under leases, cooperative agreements and use permits.
[3] Installations at this location are both owned and leased by Bureau of Commercial Fisheries.

F–3.—*Bureau of Commercial Fisheries vessel fleet, calendar year 1959*

Name of vessel	Home port	Length (feet)	Year built	Cost	Horse-power	Primary activity
Black Douglas	La Jolla, Calif.	152	1926	$75,000	325	Biological research.
Dennis Winn	Juneau, Alaska	148	1944	533,532	875	Management and biological research.
Penguin II	Seattle, Wash.	148	1950	533,532	875	Pribilof Islands supply.
Delaware	East Boston, Mass.	147	1937	302,473	735	Exploratory fishing and gear research.
Hugh M. Smith	Terminal Island, Calif.	128	1945	150,000	500	Loaned to University of California Scripps Institution.
Brown Bear	Juneau, Alaska	115	1934	130,000	400	On loan to Navy.
Charles H. Gilbert	Honolulu, Hawaii	112	1952	[1] 409,890	640	Biological research.
Alaska	Brunswick, Ga.	100	1947	300,000	600	On loan to University of California Scripps Institution.
Oregon	Pascagoula, Miss.	100	1947	300,000	600	Exploratory fishing and gear research.
John N. Cobb	Seattle, Wash.	93	1950	235,392	500	Exploratory fishing and gear research.
Crane	do	90	1928	60,000	200	Management.
John R. Manning	Juneau, Alaska	86	1950	181,600	320	Biological research.
Murre II	do	86	1943	64,000	115	Biological research.
Pelican	do	75	1930	50,200	200	On loan to State of Washington.
George M. Bowers	Pascagoula, Miss.	73	1956	93,800	210	Biological research.
Teal	Juneau, Alaska	73	[2]	40,000	175	Management.
Kittiwake II	do	72	1944	120,000	240	Management and biological research.
T–476	Boothbay Harbor, Maine.	65	[3]	[4]	230	Exploratory fishing and gear research.
Cisco	Bay City, Mich.	60	1950	85,000	175	Biological research.
Heron	Juneau, Alaska	58	1940	19,000	135	Do.
Auklet II	Seldovia, Alaska	57	1951	60,000	200	Management and biological research.
Musky	Sandusky, Ohio	53	1931	3,666	170	Biological research.
Mackinaw	Juneau, Alaska	52	1927	40,000	150	Management.
Siscowet	Ashland, Wis.	52	1946	[1] 81,000	170	Biological research.
Shang Wheeler	Milford, Conn.	50	1951	45,840	140	Do.
Alosa	Annapolis, Md.	48	1941	6,500	82	Do.
Shad	Juneau, Alaska	44	1957	23,000	110	Management and biological research.
Kingfish	St. Petersburg Beach, Fla.	43	1954	24,500	150	Biological research.
Skipjack	Cordova, Alaska	42	1943	14,600	175	Management.
Albacore	do	40	1938	6,000	122	Biological research.
Capelin	Ketchikan, Alaska	40	1939	9,695	145	Management.
J–1110	Beaufort, N.C.	40	1934	15,000	200	Biological research.
King	King Salmon, Alaska.	40	1946	16,168	175	Management and biological research.
Phalarope II	Boothbay Harbor, Maine.	40	1932	8,000	225	Biological research.
Sockeye	King Salmon, Alaska.	40	1946	16,168	175	Do.

[1] The amount includes cost of alterations.
[2] Year of construction was prior to 1927.
[3] Year vessel was built is unknown.
[4] Vessel is on loan from the Army.

Appendix G—Fish and Wildlife Service Series and a 1959 List of Publications by Bureau Personnel

Bureau of Commercial Fisheries publications appear in the following established series of the Fish and Wildlife Service:

Fishery Bulletin.—Technical reports of scientific investigations of marine and fresh-water biology, with particular reference to fish. This monographic series began publication as the *Bulletin* of the U.S. Fish Commission. Fishery Bulletins 137, 145–148, and 150–166 (946 p.) of volumes 58, 59, and 60 were issued in 1959. The series is offered for sale by the Superintendent of Documents, Government Printing Office, Washington 25, D.C., at varying prices. Some copies are distributed free to libraries and a limited number of cooperators.

Research Report.—Technical papers reporting the results of scientific investigations with emphasis on their practical application. Included are biological, technological, and economic subjects. Dealing with a Bureau of Commercial Fisheries study was Research Report 51 (42 p.), published in 1959. These reports are also sold by the Superintendent of Documents at varying prices. Copies are distributed free to libraries.

Special Scientific Report—Fisheries.—Preliminary technical reports; progress reports; results of investigations of restricted scope; oceanographic, limnological, and biological data reports; and other aids to research, such as bibliographies of specialized or restricted nature. In 1959, 41 (4,368 p.) were published, No. 335 being the last. They are distributed free to libraries and cooperators on a limited mailing list.

Circular.—Informational and advisory booklets, leaflets, and reports of a popular or semitechnical nature. Fifteen circulars (850 p.) were issued in 1959. They have a restricted mailing list. Copies can often be obtained free, on request, from the Fish and Wildlife Service, Department of the Interior, Washington 25, D.C.

Fishery Leaflet.—Popular information on fishery subjects. This series is intended primarily for use in answering public inquiries. Thirty-seven (987 p.) were issued during the year. The Fish and Wildlife Service distributes them free, on request.

Commercial Fishery Abstracts.—A monthly abstract of world literature (chiefly English language) on fishery technology. Volume 12 in 1959 had 12 issues (288 p.). Abstracts may be cut into 3- by 5-inch cards for filing. The Bureau of Commercial Fisheries distributes them free to members of the fishing industry and allied interests.

Commercial Fisheries Review.—A monthly presentation of domestic and foreign trends and developments in the fishery industry. Volume 21 had 13 issues (1,371 p.) in 1959. They have free, but limited distribution, by the Bureau of Commercial Fisheries.

Test Kitchen Series.—Information on buying, preparing, and cooking fish, with tested recipes for institutions, home economists, and housewives. This series is used to promote the use of fish. One (28 p.) was revised in 1959. They are distributed free by the Fish and Wildlife Service.

Statistical Digest.—Annual statistics with detailed tabulations relating to fishery production, manufacture, and commerce. These succeeded the Administrative Report series. One (429 p.) was published in 1959. They are for sale by the Superintendent of Documents; some are distributed free on a limited mailing list.

Current Fishery Statistics.—Current statistical information on fishery production, manufacture, and domestic or foreign trade, issued monthly, quarterly, or annually, by States, regions, or larger units. In 1959 there were 203 monthly landing reports (670 p.) for 15 States; 29 monthly reports on various manufactured products (134 p.); and 36 annual reports of sectional and State operating units, catch statistics, manufactured products, and foreign trade (304 p.).

Fishery Products Report.—Daily (5 times a week), monthly, and annual—data on landings, receipts, supplies, prices, imports, movements of fish and fish products in local areas; market conditions; fishery developments in the United States and foreign countries. Also special Market News data reports are issued sporadically. Seven Market News Service field offices prepare and mail these free reports. During 1959 the daily reports totaled 6,276 pages; the monthly and annual, 1,449 pages; and supplementary, 98 pages.

Miscellaneous publications.—In addition to the regular series of publications, the Bureau also produced 49 miscellaneous publications, totaling 432 pages.

Audiovisual material.—In addition to the regular series of publications, the Bureau also produced some audiovisual materials—films and recordings to promote public interest in fish consumption. Three 16-mm. color films and four sound film shorts were made in 1959. The films were: *Outdoor fish cookery, Salmon—catch to can,* and *Take a can of salmon.* There were two sound film shorts, prepared for television, with the title *Nutritional value of fishery products* and two entitled *Standards and inspection program.*

A detailed list of publications of the Bureau of Commercial Fisheries and its personnel during 1959 follows. The articles are listed by authors.

Publications[1]

Abrahamson, John D.

New loan funds and tax benefits now! Fishing Gazette, vol. 76, no. 2, p. 28–29, 60–63.

A. and M. College of Texas, Department of Oceanography and Meteorology.

Hydrological studies for the Corps of Engineers' proposed Mississippi River-Gulf Outlet Project, Louisiana (Report No. 1). A. and M. Project 210, Reference 59–21T, 24 p.

Ahlstrom, Elbert H.

Distribution and abundance of eggs of the Pacific sardine, 1952–1956. U.S. Fish and Wildlife Service, Fishery Bulletin 165, vol. 60, iv + p. 185–213.

Sardine eggs and larvae and other fish larvae, Pacific coast, 1957. U.S. Fish and Wildlife Service, Special Scientific Report—Fisheries No. 328, vi + 99 p.

Vertical distribution of pelagic fish eggs and larvae off California and Baja California. U.S. Fish and Wildlife Service, Fishery Bulletin 161, vol. 60, iv + p. 107–146.

[1] This list does not include Commercial Fisheries Abstracts, Current Fishery Statistics, and Commercial Fisheries Review, except a few articles for which the authors' names are given.

ALBANO, G. A.

Receipts and prices of fresh and frozen fishery products at Chicago, 1958. U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries, Chicago Market News Service, 64 p.

Shrimp marketing at Chicago—receipts, wholesale prices, and trends, 1940–58. U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries, Chicago Market News Service, 50 p.

Trends and developments. Great Lakes. U.S. Fish and Wildlife Service, Commercial Fisheries Review, vol. 21, no. 1, p. 31–32.

Trends in the Great Lakes fisheries. Seafood Merchandising, vol. 19, no. 1, p. 26–27.

ALVERSON, DAYTON L.

Prime topics at World Fishing Boat Congress: Stern vs. side trawlers, fresh vs. freezer craft, plastic fish boat hulls, atom power possibility. Pacific Fisherman, vol. 57, no. 6, p. 43, 45.

Recent developments in fishing methods and effects of management on efficiency. *In* James A. Crutchfield, Biological and economic aspects of fisheries management, p. 142–147. Proceedings of a conference held under the auspices of the College of Fisheries and the Department of Economics of the University of Washington at Seattle, February 17–19, 1959. University of Washington, Seattle, Wash.

Trends in trawling methods and gear on the west coast of the United States. *In* Hilmar Kristjonsson, Modern fishing gear of the world, p. 317–320. Fishing News (Books) Ltd., London, England.

AMBROSE, MARY E., and MAURICE BENDER.

Use of grade standards in the quality control of fishery products. Food Technology, vol. 13, no. 5, p. 249–251.

ANAS, RAYMOND E.

Three-year-old pink salmon. Journal of the Fisheries Research Board of Canada, vol. 16, no. 1, p. 91–94.

ANDERSON, ANDREW W.

Fish and the fishing industry. *In* Food, the Yearbook of Agriculture, 1959, p. 353–370. United States Department of Agriculture, Washington, D.C.

Fisheries industry. *In* The Americana Annual, 1959, p. 258–259. Americana Corporation, New York, N.Y.

ANDERSON, WILLIAM W., and JACK W. GEHRINGER.

Physical oceanographic, biological, and chemical data—South Atlantic coast of the United States, M/V *Theodore N. Gill* cruise 7. U.S. Fish and Wildlife Service, Special Scientific Report—Fisheries No. 278, v + 277 p.

Physical oceanographic, biological, and chemical data—South Atlantic coast of the United States, M/V *Theodore N. Gill* cruise 8. U.S. Fish and Wildlife Service, Special Scientific Report—Fisheries No. 303, v + 227 p.

Physical oceanographic, biological, and chemical data—South Atlantic coast of the United States, M/V *Theodore N. Gill* cruise 9. U.S. Fish and Wildlife Service, Special Scientific Report—Fisheries No. 313, v + 226 p.

Austin, Thomas S.

Secular warming in sea surface temperatures, equatorial Pacific, 1955–1958. [Abstract.] Proceedings of the Hawaiian Academy of Science, Thirty-fourth Annual Meeting, 1958–1959, p. 21.

Austin, Thomas S., and Vernon E. Brock.

Meridional variations in some oceanographic and marine biological factors in the central Pacific. *In* Preprints of the International Oceanographic Congress (1959), p. 130–132. American Association for the Advancement of Science, Washington, D.C. [Summary in English; abstract in Russian.]

Baltzo, C. Howard.

Enforcement of Alaska fisheries regulations. *In* James A. Crutchfield, Biological and economic aspects of fisheries management, p. 104-107. Proceedings of a conference held under the auspices of the College of Fisheries and the Department of Economics of the University of Washington at Seattle, February 17–19, 1959. University of Washington, Seattle, Wash.

Becker, Clarence D.

The unexpected appearance of pink salmon in the Kvichak River. *In* Alaska fisheries briefs, p. 13. U.S. Fish and Wildlife Service, Circular 59.

Beeton, Alfred M.

Photoreception in the opossum shrimp, *Mysis relicta* Loven. Biological Bulletin, vol. 116, no. 2, p. 204-216.

Beeton, Alfred M., James H. Johnson, and Stanford H. Smith.

Lake Superior limnological data, 1951–57. U.S. Fish and Wildlife Service, Special Scientific Report—Fisheries No. 297, vii + 177 p.

Berry, Frederick H.

Boarfishes of the genus *Antigonia* of the western Atlantic. Bulletin of the Florida State Museum Biological Sciences, vol. 4, no. 7, p. 205–250.

Young jack crevalles (*Caranx* species) off the southeastern Atlantic coast of the United States. U.S. Fish and Wildlife Service, Fishery Bulletin 152, vol. 59, iv + p. 417–535.

Berry, Frederick H., and Warren F. Rathjen.

A new species of the boarfish genus *Antigonia* from the western Atlantic. Quarterly Journal of the Florida Academy of Sciences, vol. 21, no. 3, p. 255–258.

Bird, H. R.

Fish meal as a source of unknown growth factor and high quality protein. *In* Summary report, symposium for nutritionists, March 18, p. 14. U.S. Fish and Wildlife Service, Technological Leaflet 20.

Studies on effect of processing and storage on the content of unknown growth factors in fish meal. U.S. Fish and Wildlife Service, Commercial Fisheries Review, vol. 21, no. 2a, p. 4–5.

Bouchard, Loyal G.

A method of temporarily marking large numbers of pink and chum salmon fry with neutral red stain. Proceedings of the Ninth Alaskan Science Conference, September 2 to 5, 1958, p. 46.

Boyar, H. C., and C. J. Sindermann.

Additional notes on the maintenance of immature sea herring in captivity. U.S. Fish and Wildlife Service, Progressive Fish-Culturist, vol. 21, no. 4, p. 185–187.

Bradley, W. H., and Peter Cooke.
Living and ancient populations of the clam *Gemma gemma* in a Maine coast tidal flat. U.S. Fish and Wildlife Service, Fishery Bulletin 137, vol. 58, ii + p. 305–334.

Briggs, John C., and Frederick H. Berry.
The Draconettidae—a review of the family with the description of a new species. Copeia, 1959, no. 2, p. 123–133.

Bright, Donald E.
Observations on the migration of king crabs (*Paralithodes camtschatica* Tilesius) in Kachemak Bay, Alaska. Proceedings of the Ninth Alaskan Science Conference, September 2 to 5, 1958, p. 46.

Brock, Vernon E., and Robert H. Riffenburgh.
Fish schooling: a possible factor in reducing predation. [Abstract.] Proceedings of the Hawaiian Academy of Science, Thirty-fourth Annual Meeting, 1958–1959, p. 32–33.

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Protein analysis of shrimp-waste meal. U.S. Fish and Wildlife Service, Commercial Fisheries Review, vol. 21, no. 2a, p. 6–8.

Brown, W. Duane, and A. L. Tappel.
Fatty acid oxidation by carp liver mitochondria. Archives of Biochemistry and Biophysics, vol. 85, no. 1, p. 149–158.

Bullis, Harvey R., Jr., and Robert M. Ingle.
A new fishery for scallops in western Florida. Proceedings of the Gulf and Caribbean Fisheries Institute, Eleventh Annual Session, November 1958, p. 75–78.

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Bullis, H. R., Jr., and J. R. Thompson.
How's shrimping off Guianas? Here is FWS research report. Fish Boat, vol. 4, no. 8, p. 33–35, 41.

Shrimp exploration by the M/V *Oregon* along the northeast coast of South America. U.S. Fish and Wildlife Service, Commercial Fisheries Review, vol. 21, no. 11, p. 1–9. [Also as Separate No. 565.]

Bumpus, Dean F.
Sources of water contributed to the Bay of Fundy by surface circulation. Journal of the Fisheries Research Board of Canada, vol. 17, no. 2, p. 181–197.

Bureau of Commercial Fisheries.
August is sandwich month. Special Fisheries Marketing Bulletin (for food editors), 5 p.

Better meals build better families. Special Fisheries Marketing Bulletin (for food editors), 9 p.

Commercial fisheries outlook. U.S. Fish and Wildlife Service, Fishery Leaflets 336*mm*, January–March, i + 45 p.; 336*nn*, April–June, i + 45 p.; 336*oo*, July–September, i + 45 p.; 336*pp*, October–December, i + 45 p.

Declaring and recording patronage refunds, 1 p.

Fish and shellfish consumption in public eating and drinking places, vol. II. U.S. Fish and Wildlife Service, Special Scientific Report—Fisheries No. 295, vi + 208 p.

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Fishery motion pictures (list of). U.S. Fish and Wildlife Service, Fishery Leaflet 452 (revised), 18 p.

Instructions for typing manuscripts to be printed at the Government Printing Office. U.S. Fish and Wildlife Service, Fishery Leaflet 483, 7 p.

List of fishermen's and fish shore workers' unions in the United States. U.S. Fish and Wildlife Service, Fishery Leaflet 293 (revised), 8 p.

List of fishery associations in the United States. U.S. Fish and Wildlife Service, Fishery Leaflet 254 (revised), 13 p.

List of fishery cooperatives in the United States. U.S. Fish and Wildlife Service, Fishery Leaflet 292 (revised), 8 p.

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Operations of the Bureau of Commercial Fisheries under the Saltonstall-Kennedy Act, fiscal year 1958. U.S. Department of the Interior, 70 p.

Outdoor fish cookery. Special Fisheries Marketing Bulletin (for food editors), 7 p.

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Proximate composition of Gulf of Mexico industrial fish. Part 5—Spring studies (1959). Laboratory Report to Industry, Technological Laboratory, Pascagoula, Miss., August, 5 p.

Proximate composition of Gulf of Mexico industrial fish. Part 6—Summer studies (1959). Laboratory Report to Industry, Technological Laboratory, Pascagoula, Miss., November, 7 p.

Scallops. Special Fisheries Marketing Bulletin (for food editors), 1 p.

School lunch recipes and menus for 1959 Lenten release, 6 p.

Soft shell clams, a major Chesapeake resource. Special Fisheries Marketing Bulletin (for food editors), 1 p.

Special Fisheries Marketing Bulletin (for food editors). Holiday issue, 12 p.

The importance of the United States fisheries to the national economy, 6 p.

BUREAU OF COMMERCIAL FISHERIES, ALASKA REGION STAFF.

Progress report on Alaska fishery management and research, 1958. U.S. Fish and Wildlife Service, Special Scientific Report—Fisheries No. 294, v + 29 p.

BUREAU OF COMMERCIAL FISHERIES, BIOLOGICAL LABORATORY, GALVESTON.

Fishery research Galveston Biological Laboratory—fiscal year 1959. U.S. Fish and Wildlife Service, Circular 62, iii+127 p.

BUREAU OF COMMERCIAL FISHERIES, BIOLOGICAL LABORATORY, SEATTLE.

Report on the investigations by the United States for the International North Pacific Fisheries Commission—1958. International North Pacific Fisheries Commission, Annual Report for the Year 1958, p. 74–119.

BUREAU OF COMMERCIAL FISHERIES, BOSTON MARKET NEWS SERVICE.

New England brokers and importers of fishery products, 1959, 6 p.

New England fisheries monthly summary (1959). Twelve issues, January to December, total 272 p.

BUREAU OF COMMERCIAL FISHERIES, BRANCH OF ECONOMICS.

Canadian fisheries program, fiscal year 1957–58, 20 p.

Survey of the United States shrimp industry, vol. II. U.S. Fish and Wildlife Service, Special Scientific Report—Fisheries No. 308, viii+167 p.

U.S. customs receipts from imports of aquatic products for calendar years 1957 and 1958, fiscal years 1957 and 1958, and list of duty free aquatic products, 18 p.

BUREAU OF COMMERCIAL FISHERIES, BRANCH OF EXPLORATORY FISHING AND GEAR RESEARCH.

Partial list of fishing boat builders. U.S. Fish and Wildlife Service, Fishery Leaflet 178, 7 p.

Partial list of manufacturers of fishing gear and accessories and vessel equipment. U.S. Fish and Wildlife Service, Fishery Leaflet 195, 27 p.

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Canned fish consumer purchases. U.S. Fish and Wildlife Service, Fishery Leaflets 478*b*, January, v+29 p.; 478*c*, February, v+29 p.; 478*d*, March, v+29 p.; 478*e*, April, v+26 p.; 478*f*, May, v+26 p.; 478*g*, June, v+26 p.; 478*i*, July, v+26 p.; 478*j*, August, v+26 p.; 478*k*, September, v+26 p.

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Frozen processed fish and shellfish consumption in institutions and public eating places. Survey methods and procedures. U.S. Fish and Wildlife Service, Circular 66, ii+18 p.

Frozen processed fish and shellfish consumption in institutions and public eating places, Atlanta, Ga. U.S. Fish and Wildlife Service, Circular 67, v+49 p.

Frozen processed fish and shellfish consumption in institutions and public eating places, Chicago, Ill. U.S. Fish and Wildlife Service, Circular 68, vi+58 p.

BUREAU OF COMMERCIAL FISHERIES, BRANCH OF MARKET DEVELOPMENT—Continued

Frozen processed fish and shellfish consumption in institutions and public eating places, Cleveland, Ohio. U.S. Fish and Wildlife Service, Circular 69, vi+46 p.

Frozen processed fish and shellfish consumption in institutions and public eating places, Denver, Colo. U.S. Fish and Wildlife Service, Circular 70, vi+48 p.

Frozen processed fish and shellfish consumption in institutions and public eating places, Houston, Tex. U.S. Fish and Wildlife Service, Circular 71, vi+45 p.

Frozen processed fish and shellfish consumption in institutions and public eating places, Los Angeles, Calif. U.S. Fish and Wildlife Service, Circular 72, vi+60 p.

Frozen processed fish and shellfish consumption in institutions and public eating places, New York, N.Y. U.S. Fish and Wildlife Service, Circular 73, vi+55 p.

Frozen processed fish and shellfish consumption in institutions and public eating places, Omaha, Nebr. U.S. Fish and Wildlife Service, Circular 74, vi+46 p.

Frozen processed fish and shellfish consumption in institutions and public eating places, Portland, Oreg. U.S. Fish and Wildlife Service, Circular 75, vi+47 p.

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BUREAU OF COMMERCIAL FISHERIES, BRANCH OF SPECIAL REPORTS.

Japanese fisheries based in overseas areas. U.S. Fish and Wildlife Service, Fishery Leaflet 485, v+26 p.

BUREAU OF COMMERCIAL FISHERIES, CHICAGO MARKET NEWS SERVICE.

List of brokers and importers of fishery products and byproducts, Chicago, Ill., 1959, 6 p.

Monthly summary of Chicago's wholesale market fresh and frozen fishery products receipts and prices (1959). Twelve issues, January to December, total 157 p.

BUREAU OF COMMERCIAL FISHERIES, DIVISION OF INDUSTRIAL RESEARCH AND SERVICES.

Inspectors' instructions for grading frozen haddock fillets, September (first issue), ii+27 p.

United States standards for grades of frozen haddock fillets, March (first issue), 5 p.

United States standards for grades of frozen halibut steaks, March (first issue), 4 p.

BUREAU OF COMMERCIAL FISHERIES, HAMPTON MARKET NEWS SERVICE.

Monthly summary of fishery products production in selected areas of Virginia, North Carolina, and Maryland (1959). Twelve issues, January to December, total 48 p.

Monthly summary of fishery products for Baltimore, Md. Twelve issues, January to December, total 76 p.

Bureau of Commercial Fisheries, New Orleans Market News Service.
Gulf of Mexico monthly landings, production, and shipments of fishery products (1959). Twelve issues, January to December, total 76 p.

Menhaden fish meal prices f.o.b. East and Gulf coasts for 10-year period (1949–1958) by weeks, 3 p.

Bureau of Commercial Fisheries, New York Market News Service.
New York City's wholesale fishery trade monthly summaries (1959). Twelve issues, January to December, total 247 p.

Bureau of Commercial Fisheries, San Pedro Market News Service.
California fishery products monthly summary (1959). Twelve issues, January to December, total 157 p.

Bureau of Commercial Fisheries, Seattle Market News Service.
Washington, Oregon, and Alaska receipts and landings of fishery products for selected areas and fisheries (1959). Twelve issues, January to December, total 101 p.

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Offshore occurrence of larval silver mullet, *Mugil curema*, in the western Gulf of Mexico. Copeia, 1959, no. 3, p. 252-253.

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CALDWELL, DAVID K., ARCHIE CARR, and LARRY H. OGREN.
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CALDWELL, DAVID K., and HUGH M. FIELDS.
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Systematic and ecological notes on some fishes collected in the vicinity of Tortuguero, Caribbean coast of Costa Rica. Revista de Biologia Tropical, vol. 7, no. 1, p. 7–33.

CALLAWAY, RICHARD J., and JAMES W. MCGARY.
Northeastern Pacific albacore survey. Part 2. Oceanographic and meteorological observations. U.S. Fish and Wildlife Service, Special Scientific Report—Fisheries No. 315, v + 133 p.

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